

Committee: Environmental Commission

Issue: Promoting sustainable agricultural practices

Student Officer: Christina Grammatikopoulou

Position: Deputy President

PERSONAL INTRODUCTION

Dear delegates,

I am Christina Grammatikopoulou and I am a student at St. Lawrence College. I have been a part of the MUN community for 3 years and I consider that the conference organized by the American College of Greece holds a special place in my heart. I hope that serving as your deputy chair in the Environmental Commission I will be able to provide you with equally wonderful experiences as those I've had as a delegate. This will be my ninth conference and my second time chairing.

Taking geography as an A-level subject, I believe I will be able to help you cover well the issue of sustainability in agricultural practices. This study guide should only constitute the basis of your research. I advise that you also look up the issue more thoroughly on your own and try to contrive more solutions.

Please do not hesitate to contact me at c.grammatikopoulos@slc.gr

Looking forward to meeting you all.

Yours,

Christina Grammatikopoulou

TOPIC INTRODUCTION

Agriculture has been a part of human civilization since the beginning of mankind and has played an important role in shaping it into what it is today. The homo-sapiens species (at least 105,000 years ago) started with being "hunter-gatherers". There would be several people solely focused on hunting animals, while others would gather berries to help them stay alive. This happened for years, up until approximately 11,500 years ago, when nascent settlers began using the seeds of the berries for planting. This helped domesticate pigs, sheep and cattle over 10,000 years ago and led to humans settle on different areas of land, creating villages. Centuries later, in the 1900s, industrial agriculture started to dominate with the rise of the industrial revolution, as it brought autonomous machinery that helped breed large-scale monoculture. These new practices have raised the question of sustainability. Sustainability focuses on the co-existence of the human civilization with the biosphere. Agricultural sustainability also refers to the saturation of the human population's needs in a way it does not bargain the future generations' capacity to meet their needs as well. With these two principles in mind, sustainable agriculture has set 3 goals to reach: healthy environment, profit and social and economic justice. Over the last decades, there has been an ever-growing need to promote other methods or smaller initiatives for sustainable practices in agriculture.

DEFINITION OF KEY TERMS

Agriculture

"Agriculture is farming and the methods that are used to raise and look after crops and animals."¹

Biosphere

A layer on the Earth's surface that supports life. It generally refers to vegetation and the living organisms that rely on non-living factors, for example, solar energy.²

¹ "Definition of 'Agriculture'." Collins Dictionary, HarperCollins Publishers, www.collinsdictionary.com/dictionary/english/agriculture.

² Thompson, Michael. "Biosphere ECOLOGY." Encyclopedia Britannica, www.britannica.com/science/biosphere.

Child Mortality

The number of children dying under the age of 5.³

Cover crops

Cover crops essentially refer to the crops leftover from intensive farming that are not used for profit.⁴

Infant Mortality

The number of babies dying under the age of 1.⁵

Intensive Farming

Agriculture that uses large areas of land for mass production. It also consists of a large amount of money being spent.⁶

Irrigation

A source of water via channels in order to water large areas of crop.⁷

Malnutrition

When a person does not consume enough (or consumes too much) nutrients.⁸

Monoculture

It is the process of repeatedly planting the same type of crop or plant on an area of land. It can lead to loss of nutrients in the soil.⁹

³ Roser, Max, et al. "Child & Infant Mortality." Our World in Data, 2020, ourworldindata.org/child-mortality.

⁴ Archer, Leigh, et al. "Cover Crops." Agricultural Sustainability Institute, 2017, asi.ucdavis.edu/programs/ucsarep/about/what-is-sustainable-agriculture/practices/cover-crops.

⁵ Roser, Max, et al. "Child & Infant Mortality." Our World in Data, 2020, ourworldindata.org/child-mortality.

⁶ Augustyn, Adam, et al. "Intensive Agriculture." Encyclopedia Britannica, www.britannica.com/topic/intensive-agriculture.

⁷ "Irrigation." Lexico, www.lexico.com/en/definition/irrigation.

⁸ "Malnutrition." Lexico, www.lexico.com/en/definition/malnutrition.

⁹ "Monoculture." Merriam-Webster, www.merriam-webster.com/dictionary/monoculture.

Ploughing

“An agricultural implement used for cutting, lifting, turning over, and partly pulverizing soil.”¹⁰

Sedimentation

When soil turns into smaller particles known as “sediment”.¹¹

Subsistence farming

A practice in agriculture where a family or a farmer has a crop of land and produces enough food for themselves. There is no excess for sales.¹²

Sustainability

“Using methods that do not harm the environment so that natural resources are still available in the future.”¹³

Urban agriculture

“Practices that include production, distribution, and marketing of food and other products within the cores of metropolitan areas and at their edges.”¹⁴

¹⁰ “Plow.” Dictionary, www.dictionary.com/browse/plow.

¹¹ “Sedimentation.” Merriam-Webster, www.merriam-webster.com/dictionary/sedimentation.

¹² “Subsistence Farming.” Merriam-Webster, www.merriam-webster.com/dictionary/subsistence%20farming.

¹³ “Sustainable.” Cambridge Dictionary, dictionary.cambridge.org/dictionary/english/sustainable?q=sustainable.

¹⁴ Archer, Leigh, et al. “Urban Agriculture.” Agricultural Sustainability Institute, 2017, asi.ucdavis.edu/programs/ucsarep/about/what-is-sustainable-agriculture/practices/urban-agriculture.

BACKGROUND INFORMATION

After the catastrophic events of World War II, the number of farms in the US declined and their average size increased. This happened in many of the More Economically Developed Countries (MEDCs). More specifically, the number of farms that were practicing “intensive farming” increased.

People stopped working on farms as machines took over simple jobs, for example, ploughing and irrigation. Farmers took advantage of industrialization and governmental policies that favored mass production. Intensive farming took over the agricultural business; food

production increased; practices of family farming – subsistence farming – had decreased. Environmental problems arose for the people who worked on these farms, such as topsoil depletion and groundwater contamination, and a decline in economic and social conditions was observed.

Negative impact on the soil

Soil is one of the most essential components of agriculture. Intensive farming has caused deforestation, increased irrigation and monoculture. Farming companies cut down trees through various methods to increase mass agricultural production. This causes many problems. Firstly, methods of deforestation, such as “slash and burn”, create carbon dioxide gas, while they also slow down the depletion of carbon dioxide in the air because there are fewer trees to take in the carbon dioxide. Secondly, removing trees regularly where rainfall occurs brings floods and soil

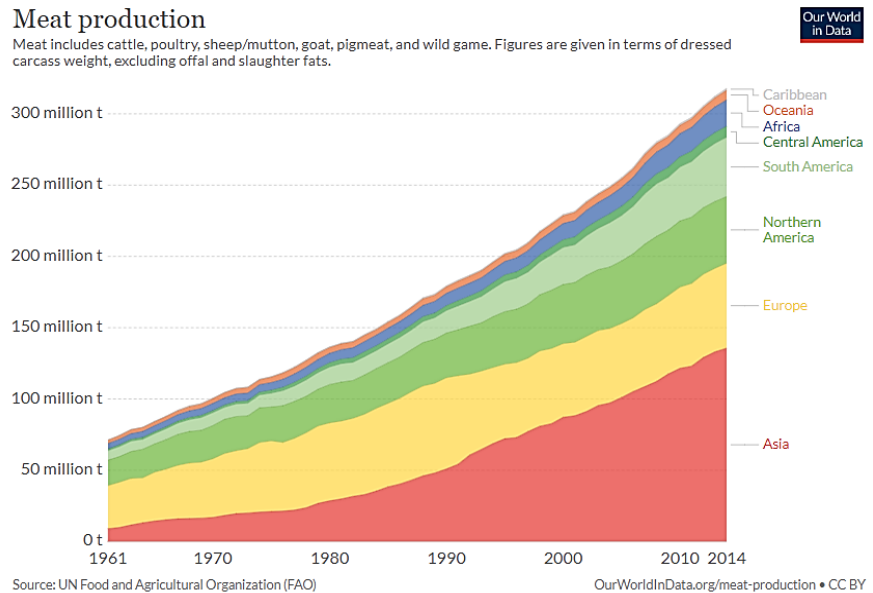


Figure 1 Meat production since 1961 until 2014 per continent

erosion. Less interception and stemflow¹⁵ occurs because the water infiltrates the soil immediately. The rainwater travels quicker to a river and will easily burst its banks. During floods, the soil is loosened by water in it and above. Water can easily move with the soil and thus the top layer will slide off. The same concept happens during increased irrigation. Thirdly, monoculture leads to infertile land. When a farmer uses the same crop constantly in an area of land, it will heavily reduce soil quality. This is due to the fact that one type of crop will require certain nutrients. The soil will run out of those nutrients and thus the soil quality is reduced. When the quality is low, soil can become loose and can disintegrate. Lastly, the use of heavy machinery on farmland causes soil compaction. Compact soil cannot absorb water easily and can overflow. This can ruin crops and allow the soil to be washed away. All the above complications create an even larger problem where there is increased sedimentation and clogging of the drainage basin that can ruin habitats thus, also endangering species.

Water Contamination

Water consumption in agriculture totals up to 70%. Agriculture is one of the main causes of polluted surface water and groundwater. Increased salt quantities and sediment loads are all part of water contamination. This is due to the fact that there is an excessive misuse of fertilizers and antibiotics in the farming business for greater production. Adding such chemicals harms species. They consume them directly and they are washed away in bodies of water, where fish and other aquatic species are harmed. In addition, local people especially in Less Economically Developed Countries (LEDCs) use that water for drinking, washing and other activities. Therefore, water contamination does not just harm animals.

¹⁵ Fretwell, Muriel, and David Kelly. "Hydrology and Fluvial Geomorphology." Geography for Cambridge International AS & A Level, Oxford University Press, 2015, pp. 4–5.

Interception: "rainwater entering vegetation before it reaches the surfaces"

Stemflow: "water moving from the tree to the ground"

Antibiotics

Antibiotics are used in farming for animals. These antibiotics, if consumed by humans, can cause Antimicrobial Resistance. There are two main ways that they can be consumed. Traces of antibiotic resistant bacteria can remain on the meat. If not cooked properly or packaged well, the bacteria can infect humans. Moreover, crops which have been fertilized or irrigated by water containing animal faeces will end up having the resistant bacteria. These crops if eaten by humans will infect them.

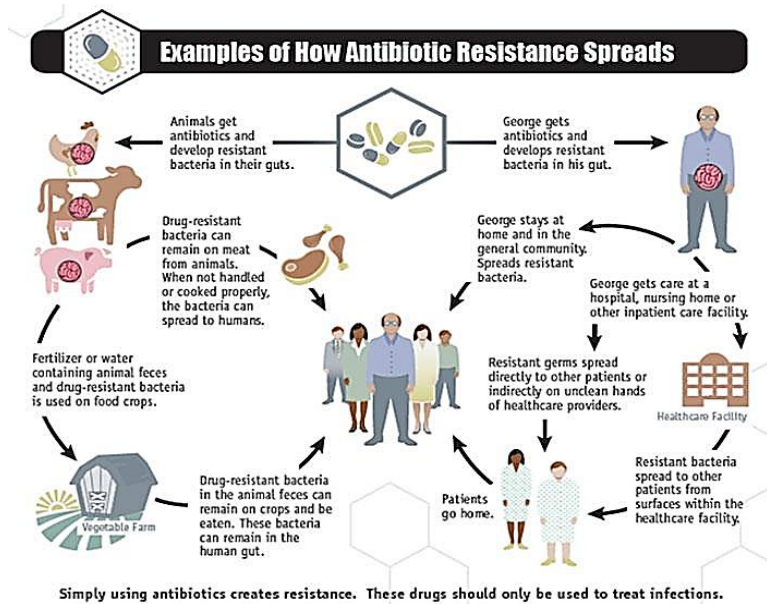


Figure 2 Examples of How Antibiotic Resistance Spreads

The Green and Gene Revolution

When talking about agricultural development over the past century, people tend to refer to the "Green" and "Gene Revolution". The Green revolution is how modern agricultural methods were spread to LEDCs. It started in Mexico in the 1960s. Their goal was to help resolve the food shortages. They started breeding hybrids of maize and wheat by cross pollination. As a result, the new hybrid was resistant to strong winds, heavy rain and diseases. The yield size also increased. These were known as high-yielding varieties (HYV). Mexico started exporting the eighteen thousand tons of the HYV seeds with fertilizer. Thereafter, LEDCs introduced tractors to replace water buffalos; communications improved so land was shareable. Unfortunately, these advances brought many environmental problems. HYV seeds require a large amount of fertilizer and pesticides. This stimulated weed growth and furthermore caused water pollution. They did not help countries that had droughts or floods as they were not resistant to such conditions. The

introduction to machinery like tractors (in order to combat the increase in products) has risen the amount of fossil fuels used, thus the carbon dioxide emissions surged in countries that had a small “carbon foot-prints”.

Genetically modified organisms (GMOs) had started in the 1970s. Scientists Herbert Boyer and Stanley Cohen successfully genetically engineered an organism. They were able to remove a trait from one organism and implement it into another. With this, they removed an antibiotic resistant trait from one bacterium and added it to another. By 1999, supermarkets in many MEDCs had a large variety of GMOs. However, in 2007 it had decreased to two products. Many environmentalists believe that we do not know the effects of these GMOs. Scientists have tested them and seen no negative results, but the long-term effects cannot be fully tested. The environmental effects can be distressing, as the GMOs and non-GMOs can cross pollinate, which can affect the wildlife in unknown ways.

Human Impact

There is a humanitarian issue as well as an environmental one, if we do not promote sustainable agriculture. Reducing soil quality and contaminated water can lead to food shortages in LEDCs. If we have a population who is malnourished, we can ruin the country's development. This is because there could be a vicious cycle of famine. Malnourishment leads to child/infant mortality and less physical and intellectual capacity. When a person cannot physically go to work or go get an education, it can lead to uneducated people and, as a result, less working people. A similar outcome will exist with child/infant mortality. There will be a decrease in educated youth. If there are fewer working people, less taxes will be paid for the government and thus little overall economic development will happen. When there is an inconsiderate amount of economic development, the government will not be able to tackle food shortages. Even though this is an issue in the environmental commission, it is vital that we find solutions to this problem otherwise we are jeopardizing the future generations which is the opposite of what sustainability aims to do.

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

Republic of France

France has the highest food sustainability index¹⁶ in the world. They strive for “Food Security” (2019-2024). The Agence Française de Développement has donated 935 million euros for their agriculture in 2018. In 2019, they had donated an additional 40 million euros helping other countries with their food production means to reduce risks of future food crises. In general, they have 5 goals they want to meet by 2024:

- 1) Reinforcing world governance for nutritional security
- 2) Developing agricultural systems and durable agriculture
- 3) Reinforcing ‘French Action’ on nutrition
- 4) Structuring durable agroalimentary to favorite creation of decent jobs in rural areas especially for young people
- 5) Reinforcing assistance to vulnerable populations and improving their resilience

Kingdom of the Netherlands

The Netherlands is one of the world’s top exporters for onion and potatoes. A third of global trade in vegetable seed originates from the Netherlands. They have the second-highest food sustainability index. In 2000, the Dutch had started their sustainability scheme with the slogan “Twice as much food using half as many resources”. The farmers have decreased their dependency on water up to 90%. This is because they have removed the use of chemical pesticides in greenhouses and 60% of their antibiotics. Even though the Netherlands is a densely populated country and is at risk of floods, they have used modern technology such as driverless tractors and quadcopters that monitor soil quality and nutrients.

¹⁶ Food sustainability index is determined by the amount of food not wasted, how low their carbon footprint in agriculture is and the proportion of starving people to obese in the country. [The Economist. “Food Sustainability Index Methodology.” Food Sustainability, foodsustainability.eiu.com/wp-content/uploads/sites/34/2017/12/BCFN_EIU_FSI_methodology_final.pdf.]

Republic of Ghana

Many Ghanaians practice subsistence farming. Only a small percentage grows crops for trading. Recently, there has been more education from farmers, who have studied agriculture abroad on different techniques, such as using high-yielding variety seeds, using organic substances as fertilizers and the idea of crop rotation to fight monoculture. However, many farmers still use “slash and burn” farming practices as it is more efficient and cost-benefit. Many of them believe it fertilizes the soil. On one hand, the statement is true. The ash leftover from organic matter can help raise the pH of the soil. On the other hand, carbon dioxide is produced, and the soil loses its nutrients over time.

Republic of Indonesia

Indonesia, with the Food and Agriculture Organization of the United Nations (FAO), aims to decrease reliance on grains and rice. They want to increase domestic production and the usage of native products like the sago palm. The Indonesians have taken a creative and innovative approach to tackle the solution: an app has been made called “iGrow”. It helps connect farmers and non-farmers to endorse sustainability in agriculture and for users to invest in plantations (large farms). Through the app, people can choose to plant one of three seeds: durian, peanuts and longan fruit on a plantation they chose to invest in.

Food and Agriculture Organization of the United Nations (FAO)

The FAO is in cooperation with other nations, who wish to change their policies and investment strategies. Their goal is to encourage the change from intensive farming to sustainable practices. They have 5 key principles for sustainability in food and agriculture:

- 1) “Improving efficiency in the use of resources is crucial to sustainable agriculture”
- 2) “Sustainability requires direct action to conserve, protect and enhance natural resources”
- 3) “Agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable”
- 4) “Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture”

- 5) “Sustainable food and agriculture require responsible and effective governance mechanisms”¹⁷

The FAO has also created a program for government officials in Egypt for the incorporation of the Sustainable Development Goals (SDG) of 2030. In October 2019, the FAO hosted a workshop on the SDGs in partnership with “the Ministry of Planning - Follow-up and Administrative Reform department; the Ministry of Agriculture and Land Reclamation; and the Ministry of Water Resources and Irrigation.”¹⁸ The program urged officials to understand the links between sustainable agriculture and the SDGs; to improve the implementation of the SDGs and it was explained to the government officials the importance of sustainable agriculture in the SDGs. It investigated the obstacles that Egypt faces to obtain food security, such as shortages in resources, ineffectiveness of the government in modernization, its dependency on other countries’ supply of crops, the Climate Emergency etc. There will be a close monitoring on how Egypt implements the SDGs.

Climate Change, Agriculture and Food Security (CCAFS)

CCAFS conducts research on the connections between agriculture and climate change. They have thought of ways to reduce poverty in rural areas through the promotion of agriculture and use of local resources. CCAFS is a part of partnerships to tackle climate change and agricultural issues.

African Biodiversity Network (ABN)

ABN helps Africans express their opinions on issues such as food and seed sovereignty. Their goal is to help organizations and individuals to work together to counterattack harmful actions and to promote respect for nature. This organization works with countries like Benin, Ethiopia, Mozambique and many more.

¹⁷ FAO. “Strategic Work of FAO for Sustainable Food and Agriculture.” Food and Agriculture Organization of the United Nations, 2017, www.fao.org/3/a-i6488e.pdf.

¹⁸ Food and Agricultural Organisation. “FAO in Egypt.” Food and Agriculture Organization of the United Nations, 2019, www.fao.org/egypt/news/detail-events/en/c/1255217/.

United Nations Environment Programme (UNEP)

UNEP is an organization that has organized agendas for the UN, to endorse nations to cooperate for the protection of the environment. Recently, it has helped improve Kenya's water supply in Mtwapa Creek. Waste from nearby prisons was deposited in the creek. There has been an increase in the number of prisoners which has exceeded the prison's capacity and has increased the waste produced which is thereafter dumped in the area. The Kenya Marine and Fisheries Institute and UNEP have used green technology to combat this problem. Constructed wetlands work just as natural wetlands (an area near a river dedicated for flooding). The polluted water will be sent to the artificial wetlands where there is gravel and sand to filter the water from waste. The filtered water will be used to irrigate the prison farm to help with food shortages and combating malnutrition.

TIMELINE OF EVENTS

Date	Description of event
8,000 BC	The Sumerians started settling near rivers Tigris and Euphrates and relied on the canal for irrigating their crops.
1492	Christopher Columbus brought new crops to Europe from the Americas.
1701	Lawyer Jethro Tull invented an improved seed drill.
1760	The Industrial revolution.
1784	Engineer Andrew Meikle innovated a threshing machine that would replace hand threshing with a flail.
1945	The formation of the Food and Agricultural Organization.

1950	The Green Revolution, where western technology spread to LEDCs, e.g. Mexico's maize and wheat hybrid.
1960	The "chemical-free" farming movement started.
1970	The Gene Revolution: the introduction of GMOs in agriculture by ridding of negative traits in species.
1972	The formation of the United Nations Environmental Programme. The organisation uses agendas to help tackle the issues relating to the environment.
1990	Foods Productions Act established. It helped organise what products can be considered organic.
2000	The Millennium Summit of the United Nations was held where the Millennium Development Goals (MDGs) were set to be reached by 2015.
2015	The 17 Sustainable Development Goals (which replaced the MDGs) were set by the United Nations General Assembly to be reached by 2030.

RELEVANT RESOLUTIONS, TREATIES AND EVENTS

Sustainable Development Goals (2030)

The countries of the UN in partnership with the UN Department of Economic and Social Affairs, devised 17 goals. It plans to tackle poverty, promote sustainable agriculture, provide education, endorse equality, confront problems relating to economy, create sustainable

settlements and much more. The goals concern all countries. The goals that are most important for this topic are:

- 1) “Zero Hunger” (Reducing the number of people undernourished and accomplishing food security)
- 2) “Clean Water and Sanitation” (Sustainable use of water and increasing access)
- 3) “Life on Land” (Encouraging sustainable use of the environment).¹⁹

In order to pursue these goals, countries must think of sustainable ways of agriculture. Only when that is achieved, they will be able to solve problems such as water contamination, misuse of land and food shortages.

A/70/472 - Agricultural technology for sustainable development

It is vital to find new technologies for sustainable agriculture because they can solve problems such as inefficiency and carbon dioxide emissions. In addition, we must be able to help LEDCs develop sustainably, as they have not reached stages of development in agriculture like More Economically Developed Countries (MEDCs). The resolution mentions for government officials to encourage cooperation between them to improve agricultural technology. It also encourages member states to help LEDCs transition to the use of sustainable technology. A country cannot provide an LEDC advanced technology and be able to expect the farmers to know how to use it. A second point they have made that relates to this topic is that the technology can be easily accessible economically. Individual farmers might not have the financial comfort in order to be sustainable, so we must provide everyone with a choice. Moreover, it endorses the implementation of new techniques and methods of farming. A third point the General Assembly have made is that member states adopt policies that pertain to sustainable agriculture and to increase efforts into achieving the SDGs. A final point that is very important is that it asks for UN organizations, e.g. FAO, to help member states to adopt sustainable food habit. This can be done through conservation agriculture and the use of agricultural technologies.

¹⁹ “Sustainable Development Goals.” United Nations, 2015, sustainabledevelopment.un.org/?menu=1300.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

There has been a plethora of attempts to achieve sustainable farming. One of them is organic farming. It is a method of agriculture that avoids using artificial pesticides, insecticides, herbicides and fertilizers. Organic agriculture became very popular because chemically intensive farming became harmful to humans and the environment. When organic farming was first introduced, very few consumers knew whether any of their products bought were organic as there was very little regulation. Demand had increased and in USA The Congress passed the “Foods Productions Act” in 1990. It determined what qualities a product needs to have to be considered an “organic product”.

In organic farming cover crops are popular. Crops were specifically grown to use as fertilizers to increase soil quality. However, with the rise of chemical fertilizers, farmers stopped growing cover crops. This meant that they could use more land for mass production. In farming practices, there has been a renewed interest as people have started to become more sustainable with their farming. Cover crops improve soil health, reduce soil erosion and controls pests and diseases. Organic agriculture is very popular.

POSSIBLE SOLUTIONS

In order to tackle the issue, we need to think of ways where we can be more sustainable. Urban agriculture (UA) can include school gardens and backyard or rooftop gardening. UA can help metropolitan areas in many ways. Food is produced within the city so there is less money spent on transportation and the corresponding fossil fuel use. Moreover, carbon dioxide levels can decrease in cities due to increased farming. Backyard beekeeping can help the community. UA has a variety of economic and social benefits.

One of the biggest ways we can become more sustainable is by using renewable energy. We can incorporate solar, wind, tidal, wave and geothermal energy in our farming. Therefore, the development of renewable energy dependent farming machinery is needed. We can invent replacements for tractors that use diesel fuel.

In addition, we can also promote and raise awareness to already existing sustainable methods. Crop rotation has been used to tackle monoculture for years. Plants are chosen in such

a way where in one season nutrients from one plant that have been used will be able to replenish when another plant in a different season is planted. It helps upkeep soil quality e.g. row crops are sowed after grains.

Furthermore, there can be better water management. For better water management there can be a better choice of crops. Local crops are better for agriculture as they are used to the weather conditions in that area. In dry areas plants that require less water are recommended. Irrigation systems can be of high quality to avoid issues like river depletion, dry land and soil degradation.

There are also plenty of ways of reducing soil erosion. Terracing is a way of reforming a slope to essentially create giant steps. Contour ploughing prevents water flowing down the slope and eroding the soil. It refers to ploughing perpendicular to the downwards slope.

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