

Bio Farming for Agricultural Sustainability under Climate Change

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Introduction

The world is witnessing a remarkable increase towards bio farming technology, as the total global cultivated areas reached about 70 million hectares of farmland, and the world has turned to this technology driven by the following reasons:

- The consumer's desire to obtain safe food that does not contain pesticide residues or chemicals.
- Reducing environmental degradation: The current agricultural practices have led to the use of pesticides and chemicals that pollute the soil and water and hence the food chain (food and water).
- Preserving the fertility and vitality of the soil by repeatedly using compost and not using pesticides.
- Preserving biological diversity.
- Maintaining human health by avoiding consumption of food and water contaminated with pesticides.
- The profitable material return for bio farming.

Bio farming is based on the use of organic and bio fertilizers (natural and manufactured) instead of using chemical fertilizers as well as the use of safe green pesticides and pesticides alternatives because of this has a good impact on agricultural products in terms of producing safe and clean agricultural crops without pollution and the accumulation of harmful elements in human health, in the eaten part, especially nitrate accumulation, which is mainly due to the unguided use of nitrogen fertilizers.

The most important thing facing human beings is to try to stop the continuous deterioration of nature and secure the development that helps the human being and protect the environment at the same time.

Traditional agriculture, which is prevalent in order for a person to produce his various living needs, but indicated its inability to secure this due to the dependence of these crops on harmful inputs in the production system of different crops, which formed a backlash on natural environments, and became largely responsible for the dangers that threaten human lives. On the other side, nearly several decades ago, a new awareness and an increase in our time began to appear to offset the negative environmental impacts resulting from traditional agricultural techniques. This was known as alternative agricultural techniques, and this is what became known as bio farming, which includes all agricultural systems (environmental). To biology and biodynamic and these systems take into account soil fertility as a basis for productive capacity and work to preserve and respect the innate nature of plants, animals, and wildlife, and link them all together.

Also, alternative or organic agriculture greatly reduces external inputs, such as fertilizer and synthetic pesticides, and leaves the largest and fundamental role of nature in its laws in order to best perform its role.

Organic crops secure the genetic richness and benefit from all elements of the environment and are economical if we take into account the effects of traditional crops in the long run such as desertification of lands and chemical deposits in the environment

and pollution control and living organisms that fall under industrial pressures such as chemicals, compounds, hormones and others.

Bio farming, also known as bio-agriculture, is considered as an approach taken towards reaching an integrated system based on a set of processes that result in a sustainable organic system, providing safe food, proper nutrition, animal husbandry, and social justice.

In this system, soil fertility is the key to success taking into consideration the natural potential of soil, plants and animals as a basis for producing food with good specifications and high health value. Bio agriculture does not use chemical fertilizers, pesticides and hormones synthetic, as well as genetic changes using genetic engineering.

Quality and Nutritional Value of Bio Products

- Several studies were conducted to study the quality and nutritional value of the fruits produced under the conditions of organic farming compared to traditional crops. It has shown an increase in some foodstuffs for bio farming products. In studies conducted on apples, it was found that the fruits produced in traditional agriculture also found that the content of flavones in organically produced fruits was higher.

- Another study showed that the fruits of organically produced tomatoes were more sweet and that the organically produced carrots had better taste and flavor characteristics than the traditional method

- In many studies conducted on many vegetable crops, such as tomatoes, cabbage, lettuce, spinach and carrots, in the conditions of organic bio cultivation and compared to the traditional cultivation, they were found that, there was an increase in the content of iron, magnesium, phosphorus and vitamin C in organically produced crops compared to crops grown in ordinary methods. Also, it was found that organic farming had a positive effect in reducing the chemical residue content in fruits and reducing nitrate content. However, there is still a need to conduct other studies to clarify how plants respond to and interact with different soil conditions by which the nutritional value of organic products can be explained in comparison to traditional farming methods.

Benefits of Bio Farming

- Bio agriculture preserves the environment as it reduces water contamination with chemicals and pesticides.

- It reduces the use of non-renewable energy sources and manufactured materials and thus reduces global warming and large absorption of soil carbon.

- Makes the soil a living environment in which useful animals and creatures grow.

- It contributes to enriching wildlife and increasing the numbers of natural enemies and beneficial predators.

- Strengthening the strength and building of the soil through following cropping cycles, increasing the organic materials and stimulating the reproduction of animals, plants and microscopic soil.

- Provide healthy food free of antibiotics, chemicals and pesticides.

- Reducing the risks to farmers resulting from the use of toxic substances.

- Developing the countryside and making it harmonious with nature and a better absorption of manpower.

Most certified bio products are for export markets, and the vast majority is exported to the European Union. The African market for organic products remains small. Certified organic products are currently recognized in a few domestic markets, including Egypt, South Africa, Uganda, Kenya and Tanzania. For exports, most African countries rely on foreign standards. To date, most of the certified organic production in Africa has been certified in accordance with European Union regulations for organic products for Egypt, although there is an enhanced market for organic food acquired from its importance as safe production, high-quality food and its positive environmental impacts. The supply market is growing much faster than organic food consumption [1]. The rationale for this situation is that organic farming is mainly grown in the export market. As a result, the share of organic farmland increased and represented about 0.01% of the total agricultural land. It ranked third among African countries after Uganda and Tunisia [2].

Bio Farming and Climate Change

Sustainable agriculture mitigates climate change and has the potential to adapt to climate. Sustainable agriculture, by definition, reduces damage to the environment, for example by limiting or removing pollutants such as pesticides and nitrogen fertilizers, water conservation practices, soil conservation practices, soil fertility restoration, and the conservation of agricultural biological diversity and biological diversity etc. An FAO review summarizes many of these environmental benefits in relation to organic farming [3].

More importantly, sustainable agricultural practices can mitigate climate change. Bio agriculture, for example, uses fewer fossil fuel based inputs and has a better carbon footprint than traditional agricultural practices. This is because traditional agricultural production uses more public energy than organic systems because of the heavy reliance on energy-intensive fertilizers, chemicals and concentrated feed, which is abandoned by organic farmers [4]. Bio farming performs better than conventional one-hectare agriculture, in terms of both direct energy consumption (fuel and oil) and indirect consumption (synthetic fertilizers and pesticides), with high energy efficiency [3].

Agriculture has the potential to change from being one of the largest greenhouse gas emitters to a carbon capture center,

while offering mitigation options. The solutions call for a shift to sustainable farming practices that build carbon in the soil and use less fertilizer [5]. There are a variety of sustainable agriculture practices that can reduce the contribution of agriculture to climate change, and which are easy to implement. These include crop rotation and improvement in agricultural design, better management of agricultural land (such as avoiding leaving bare lands, using an appropriate amount of fertilizer, not burning crop residues in the field, and reducing tillage), nutrient and natural fertilizer management, pastures and livestock and managing and maintaining fertile soil Restoring degraded lands, improving water and rice management and demobilization, land-use change and agro forestry [5, 6].

Bio Farming has Great Potential to Reduce Emissions

Improved soil fertility stabilizes organic matter in the soil and in many cases isolates carbon dioxide in the soil. This, in turn, increases the water retention capacity in the soil, which contributes to better adaptation to organic farming under unpredictable climatic conditions with higher temperatures and uncertain levels of precipitation. Organic production methods that emphasize soil carbon retention are likely to withstand climate challenges, especially in those countries most vulnerable to increased climate change. Soil erosion, an important source of carbon dioxide losses, is effectively reduced through organic farming.

Bio Farming can Contribute Greatly to Agro-Forestry Production Systems

Bio systems are largely adapted to climate change due to the application of traditional skills, farmers' knowledge, soil fertility building techniques and a high degree of diversity.

The study concluded that: "In agriculture, bio farming occupies a particularly favorable position, because it realizes mitigation and carbon dioxide isolation in an effective way. Bio production has great potentials for mitigation and adaptation, especially with regard to stabilization of organic matter in topsoil. Soil fertility and capacity To conserve water, increase yields in areas with medium to low input agriculture and in agricultural forests, and enhance farmers' resilience. Paying farmers for carbon sequestration can be considered a win-win situation where (a) carbon dioxide is removed from the atmosphere (dilution); (B) g Increasing soil organic matter levels enhances its ability to adapt (adapt); (c) Improving soil organic matter levels improves crop productivity production.

Crucially, for farmers who are forced to cope with increased climate fluctuations and extreme weather events in the near future, sustainable agriculture, by increasing resilience within the agricultural ecosystem, increases its ability to continue to operate when faced with unforeseen events such as climate change. For example, bio farming builds resilience on farms because it promotes agro-resilience, biodiversity, healthy landscape management, and

strong community knowledge processes. Improving soil quality and effective water use enhances agricultural ecosystems, while practices that enhance biodiversity allow farmers to simulate natural environmental processes, which enable them to better respond to change. Sustainable agriculture practices that maintain fertility and increase organic matter in the soil can reduce the negative effects of drought while increasing crop productivity [6].

Bio farming is not only a specific agricultural production system, but also a systematic and holistic approach to sustainable livelihoods in general, where due consideration is given to impact factors related to sustainable development and vulnerability, be it at the physical, economic or social - cultural levels [7]. Bio farming has a long tradition as an agricultural system and has been adapted to many climatic regions and local conditions; as a result, a lot of detailed information is available on organic farming. Moreover, organic agriculture has potential as recognized as a development strategy for rural communities [7-10].

The Challenges were Addressed

Bio farming avoids nutrient use and increases the organic matter content in the soil. As a result, the soil in organic farming captures and stores more water than the soil in conventional farming [6]. Consequently, production in organic farming systems is less vulnerable to severe weather conditions, such as droughts, floods and water registration. Consequently, organic agriculture addresses the main consequences of climate change, namely increased incidence of extreme weather events, increased water stress and drought, and soil quality problems [11].

Moreover, bio farming reduces farmers' vulnerability to climate change and variability. First, bio farming includes very diverse agricultural systems, and thus increases the diversity of sources of income and flexibility to deal with the negative impacts of climate change and variability, such as changing rainfall patterns. This leads to higher economic and environmental stability through optimal environmental balance and risk diffusion. Secondly, organic farming is a low-risk cultivation strategy with low input costs, thus lowering risks with partial or total crop failure due to severe weather events or changing conditions in the aftermath of climate change and variability [7,9]. As such, it is a viable alternative for poor farmers. In addition, higher product prices can be achieved through organic certificates. Thus, higher farm income is possible due to lower input costs and higher selling prices. Increased farm adaptation and reduced debt risks.

Bio farming is by its nature an adaptation strategy that can target improving the livelihoods of rural people and parts of societies particularly vulnerable to the negative impacts of climate change and variability - for example, rural people in sub-Saharan Africa. Improvements by reducing financial risks, lowering indebtedness, and increasing diversification [7]. Bio farming, by its systematic nature, is an integrative approach to adaptation, with the potential to also work towards the United Nations.

Less carbon dioxide emissions through erosion (due to better soil structure and more vegetation) - corrosion is usually lower in Bio agriculture systems than in conventional systems. However, the impact of corrosion on carbon dioxide emissions remains controversial [12-14] and reducing carbon dioxide emissions from agricultural system inputs (pesticides) Fertilizers produced using fossil fuels).

The effects of animal husbandry on mitigation in bio farming must also be evaluated. Animal manure is often of particular importance to organic farms, but livestock are also an important source of greenhouse gases [6,12].

Carbon sequestration in soil is enhanced by agricultural management practices (such as increased application of organic fertilizer, use of crops and green manure, higher stakes of pasture, trees or permanent hedges, etc.), which promote more organic matter in the soil (and hence organic carbon soil) And improved soil structure [1,2,6,16,17]. The increase in soil organic carbon in agricultural systems has also been mentioned as an important mitigation option on the part of [12]. The very approximate global mitigation potentials of organic agriculture are 3.5 - 4.8 gigatonnes of CO₂ from carbon sequestration (about 55-80 percent) of total global greenhouse gas emissions from agriculture) and reducing nitrous oxide by two thirds [6].

Recommendations about Bio Farming

- Legislation for national laws for bio farming should be developed.
- Prepare short and long term plans for bio agriculture movement and identification of problems and proposed solutions.
- Present a support plan for producers and exporters in kind or money.
- Encourage and support establishment of organic and bio associations specialized in production and/or marketing.
- Development of processes of post-harvest, e.g. dehydration, grading, packing and cooling.
- Encouragement of production of organic seeds and seedlings.
- Establishment of database and information centers for bio farming.
- Establish a market information center for bio products and making it accessible to exporters.
- Encourage exports to international markets.
- Increase public awareness on bio farming and the need for safe food.

- Establish more directorates for bio farming within the entire governorate as well as train the officials who are in charge of the bio agriculture.

Acknowledgement

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Conflict of Interest

No conflict of interest.

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