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S&T REVIEW

ORGANIC FARMING: A FEASIBLE SOLUTION TO AGRICULTURAL SUSTAINABILITY: A DETAILED REVIEW

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ABSTRACT

The overuse of chemicals and pesticides on the concept of increasing production is declining soil health, biodiversity, and cropland. As a result of which it has been a major threat to agricultural longevity to be the same in future generations. Organic agriculture boosts agricultural production while also improving soil and consumer health, and it appears to be a superior alternative in many nations where the integrated crop-livestock system is still widespread. The paper attempts to bring light on the current scenario of paced organic agriculture and the solutions to restore pesticide-dominated agricultural farming.

KEYWORDS

Nutrition, Environment, Organic, Agriculture

1. INTRODUCTION

Organic agriculture is a type of farming that promotes soil, ecosystem, and human health. Rather than using harmful inputs, it relies on ecological processes, biodiversity, and cycles that are tailored to local conditions. Organic agriculture brings together tradition, innovation, and science to benefit the environment while also promoting fair relationships and high quality of life for all parties involved (East African Community, 2007). Organic farming is an agricultural producing system that combines a high degree of biodiversity with environmental measures that protect natural resources and has strict animal welfare requirements. Moreover, organic farming corresponds to the increased demand for natural products among consumers while also allowing for environmental preservation in the context of long-term rural development (Mrinila and Keshav, 2017). This system excludes the use of chemical fertilizers, and different types of pollution including air, water, and soil that contribute to the improvement of health and crop productivity (IFOAM, 2002). The popularity of organic food is rising. Consumer concerns about conventional agriculture's harmful effects on human health and the environment are largely to blame for the rising demand. Most people believe organic food is safer and better than conventionally produced food, especially in industrialized countries (Funk and Kennedy 2016). Organic farming has such a strong public image that it is sometimes referred to as the model for long-term agricultural sustainability.

2. MATERIALS AND METHODS

Secondary data sources are solely used to accumulate the information. Different internet sites are visited to gather information and the farmer's activities and outcomes were observed.

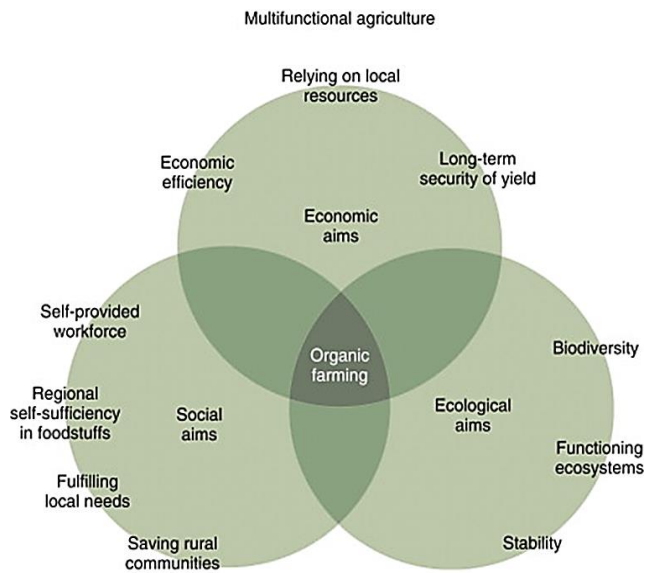
3. DISCUSSION

3.1 Principles of Organic Agriculture

Agriculture, livestock, wildlife collection, beekeeping, fishery, and processing, among many other things, are all covered by organic standards. Activities that are forbidden or restricted, as well as activities that are necessary or recommended, are covered by the standards (Mrinila and Keshav, 2017). Balanced crop rotations with legumes, nutrient recycling (e.g., via farming systems), and the use of organic fertilizers are

all foundations of organic production systems. Chemical pesticides and synthetic fertilizers are not permitted. The animals in livestock production must be fed organic fodder, especially from the same farm, and given enough space and access to outside regions.

- Organic agriculture's goal, whether in cultivation, manufacturing, transmission or use, is to maintain and improve the wellness of ecosystems and creatures, from the tiniest bacteria in the soil to humans. Organic agriculture, in particular, aims to create high-quality, nutrient-dense food that aids in health prevention and well-being. As a result, it should avoid using fertilizers, pesticides, animal medications, and food additives that could have negative health consequences.
- Organic agriculture should be built on living natural processes and cycles, which should be worked with, emulated, and helped to perpetuate. Organic agriculture is based on this notion, which places it within live ecological systems. It specifies that production should be based on environmentally friendly procedures and recycling. The ecology of the unique production environment provides nourishment and well-being. This is the living soil in the case of crops, the farm ecosystem in the case of animals, and the aquatic environment in the case of fish and marine species.
- Organic agriculture should be based on mutually beneficial relationships that ensure equality in terms of the environment and life opportunities. Equity, respect, justice, and guardianship of the common world are characteristics of fairness, among people and in their interactions with other living species.
- In organic agriculture, prudence and accountability are the most important considerations in management, development, and technology choices. Organic agriculture requires science to assure that it is healthy, safe, and environmentally sound. Scientific knowledge, on the other hand, is insufficient. Time-tested solutions are based on practical experience, accumulated wisdom, and traditional and indigenous knowledge. Organic agriculture should avoid major dangers by implementing acceptable technologies and avoiding risky ones like genetic engineering. Via transparent and participatory processes, choices should represent the values and needs of all those who may be affected.



Source: Encyclopedia of ecology, 2008

3.2 Organic Foods Nutrition and Health Impact

Organic foods are frequently seen by consumers as being more nutritive and healthier than processed food (Seufert et al., 2017). In theory, this might be due to organic foods being less contaminated with dangerous elements or having higher levels of nutritionally beneficial ingredients. A huge body of research has looked into whether or not there are significant chemical changes between organic and conventional foods. Several essential aspects influence the quality of food products, and these same factors apply to organically grown plant products. A considerable body of evidence suggests that the concentration of nitrates and nitrites in conventionally grown crops is significantly higher than in organically grown crops. This is significant because nitrates can readily be converted to nitrites, which can cause methaemoglobinaemia, a serious sickness that affects neonates, infants, and the elderly.

Organic plant products often have a greater dry matter, vit C, phenolic compounds, essential amino acids, and total sugars than non-organic plant products. However, the level of -carotene in typical plant products is frequently higher. Statistically, organic plant products include more iron, magnesium, and phosphorus (Rigby and Caceres, 2001). More chromium, iodine, molybdenum, selenium, calcium, boron, manganese, copper, potassium, sodium, vanadium, and zinc are also found in them. Organic plant products usually have a higher sensory quality. Due to their greater dry matter content, they have a sharper smell and taste, as well as being sweeter and more compact. Organic food should be advised to everyone, but especially to newborns, pregnant and nursing mothers, the elderly, the chronically ill, and vegetarians. The last group eats a lot of veggies, which can contain excessive amounts of carcinogenic chemicals when grown traditionally.

| Component | Mean Difference | Range (%) | Number of Studies |
|--------------------|-----------------|----------------|-------------------|
| Vitamin C | +28.7 | -38 to + 135.5 | 21 |
| Phenolic Compounds | +119.3 | -56.6+734.2 | 15 |
| Iron | +21.1 | -73+240 | 16 |
| Magnesium | +29.3 | -35+1206 | 17 |
| Phosphorous | +13.6 | -44+240 | 18 |

Source: (Worthington, 2001)

3.3 Environmental Impacts

In recent years, the effectiveness of agricultural subsidy programs in preserving biodiversity and benefiting the ecosystem has been questioned. Pesticides, herbicides, and inorganic fertilizers are not used in organic farming, and crop rotation is frequently more diverse. This system has been recommended to improve biodiversity in agricultural areas. Biomass burning produces CH₄ and N₂O, which account for 12% of agricultural GHG emissions. The carbon stored in the charred biomass is also released into the atmosphere. Land preparation by flaming vegetation

is kept to a bare minimum in organic agriculture. The certification of main ecosystems that have recently been destroyed or altered is prohibited under IFOAM organic standards³.

As a result, organic agriculture helps to halt deforestation caused by forest conversion to farmlands (which accounts for 12 percent of world GHG emissions) and so plays a significant role in climate change mitigation (Secretariat of the Pacific Community, 2008). However, organic standards must be further developed. In terms of pesticides, the risk of pesticide pollution of water bodies is reduced because synthetic pesticides are prohibited in organic farming (Reganold and Wachter 2016). Certain nonsynthetic pesticides used in organic farming, on the other hand, can be harmful to aquatic life. Copper-based treatments, for example, are commonly used to combat fungal infections in organic horticulture (Niggli, 2015).

4. CAN ORGANIC AGRICULTURE FEED THE WORLD?

Many people believe that organic agriculture is the most sustainable way of farming and that it will be the future scenario for world food supply. As a result, the question of whether organic agriculture alone could feed the world's 7.5 billion people today, and likely more than 9 billion by 2050, has been raised several times (Badgley et al., 2007; Connor, 2008; Erb et al., 2016; Seufert and Ramankutty 2017; Muller et al., 2017; Taheri et al., 2017). Given that organic farming now accounts for only 1% of agricultural land, a 100% conversion to organic agriculture does not appear to be a realistic scenario soon, but it is an exciting thought exercise anyway.

4.1 Sustainable Consumption and Food Security

Organic farmers safeguard the environment and emphasize soil health, wildlife protection, clean and fresh water, and nutrient-dense produce by avoiding the most hazardous synthetic inputs. Their focus is usually on developing healthy, resilient ecosystems rather than increasing crop production (Szponar and Kierzkowska, 1990). It is false, however, that the yield differential between organic and conventional crops is significant, or that organic crops never yield as many as conventional crops. Organic crops outperform conventional crops by up to 40% in harsh climatic circumstances like drought. "...sustainability is at the foundation of organic farming, and it is one of the most important elements in assessing whether or not specific production strategies are acceptable" (Parajuli et al., 2020).

In a similar vein, assert that their concept of organic farming "may serve equally well as a concept of sustainable agriculture" (Henning et al., 1991). "Sustainable" was, according to Rodale, "simply a polite phrase for organic farming" (York, 1991). Organic farming yields a higher return on investment for farmers. In addition, it is a low-input farming approach. This means farmers won't have to spend as much money on chemical pesticides and fertilizers, which can put them in debt and create a vicious cycle that's difficult to break away from. Organic agriculture can assist to alleviate poverty by boosting returns on the work farmers invest in their farms and lowering the cost of inputs. Crop yields on disadvantaged farms around the world are improving by 70% or more thanks to low-tech, sustainable agriculture. This has been accomplished by substituting natural pest control and fertilizers for synthetic pesticides.

4.2 Employment Generation

A significant anti-poverty technique is to provide income through employment. Given the traditional farming knowledge of farmers in a marginal ecosystem, absorbing unskilled labor into organic agriculture is easier than in nonfarm sectors, making them easily trainable for commercial organic farming. Some organic agriculture approaches need more labor than conventional agriculture in terms of operations. Land preparation, fertilizer manufacturing and application, and weeding in particular, which necessitates the use of hired labor, are all examples of these operations. Mulching, terracing, traps, and manure or composting are all manual activities in organic methods. Organic agriculture is often more labor-intensive than conventional agriculture, which might make it a good technique for creating jobs in rural regions.

4.3 Improved Agricultural Productivity

Organic farming is thus significant because it is a holistic production management method that promotes and increases agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. Organic farming practices have been proved in numerous studies to produce even higher yields than conventional agricultural methods. The excluded use of chemical pesticides makes the soil fertile increasing better microbial decomposition, improving infiltration, and keeping soil fertile leading to maintaining its productivity in a sustained way.

5. CONCLUSION

In the sphere of agriculture, the expanding population and demand for various agricultural goods have become a significant challenge. Crop yield and soil health are two main challenges facing agriculture soon. Human and environmental health are being significantly harmed as a result of the unsupervised use of synthetic farming methods such as inorganic fertilizers, insecticides, herbicides, and other chemicals. The fertility of the soil is deteriorating, which is affecting crop yields. Pesticides are gradually becoming immune to pesticides when they are used excessively and uncontrolled. As a result, organic farming is the only viable alternative to synthetic fertilizers for long-term agricultural sustainability. Organic farming is widely regarded to be capable of increasing crop yield, improving soil quality, and manipulating soil parameters over time. This is because organic matter decomposes, releasing macro and micronutrients into the soil solution, which are then accessible to plants throughout the crop season, resulting in increased nutrient uptake and improved soil characteristics.

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