REVIEW ARTICLE

AN OVERVIEW OF ORGANIC FARMING IN NEPAL

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ABSTRACT

Excessive use of agro-chemicals has led to negative impacts on the environment, animal and human health hazards, and ultimate economic losses. A country with high biodiversity, diversified ecosystem, forest, flora, fauna, and traditional based knowledge gives opportunities to organize organic moment in Nepal at the same time it creates rural employment and alleviate poverty. Organic farming emphasis the sustainability of the ecosystem as a whole. Lack of certification process, awareness among the producers, unavailability of organic manures, diseases, and pest infestation. Contradictory government laws, budgets, and policies are the challenges for organic farming in Nepal. This review paper attempts to present the status of organic farming and underscore scope, prospects, constraints of organic farming in the context of Nepal.

KEYWORDS

Environment, Organic farming, Sustainability Agro-chemicals.

1. INTRODUCTION

Sustainability is now a matter of great concern and has been a guiding principle for all economic and political sectors since the UN Conference on Environment and Development in Rio in 1992 (Siebrecht, 2020). Improved crop varieties, modified management, and the use of external inputs (e.g., fertilizers, biocides) led to increases in crop yields and food production but at the same time natural resources were jeopardized and different forms of environmental degradation became apparent (e.g., air and water pollution, soil depletion, diminishing biodiversity, dwindling underground water reserves, pest resistance, the resurgence of new weeds, loss of friendly insects, altering the environment for producers, workers as well as co consumer (Pingali, 2012; Willer et al., 2008). Green revolution & Conventional agriculture was described as unsustainable and, therefore, alternatives to conventional agriculture were often seen as being sustainable (Lampridi et al., 2019). This is the reason where the understanding of Organic Agriculture as an alternative form of agriculture or ideology has its origin for sustainability.

Organic agriculture is that way of farming systems which excluded the use of fertilizers, pesticides, insecticides, plant growth regulators, etc which mainly focuses on the organic sources for maintaining soil fertility, supply plant nutrients and minimize insect pest and diseases (Is and Agriculture, 1880). Organic farming is not only the best way of sustaining soil health but also plays a significant role in biodiversity conservation which is environmentally supportive and economically ecologically and socially acceptable (Tamang et al., 2011). Organic materials for crop production such as compost and manure are used to maintain soil organic matter and as sources of nutrients. Soil building practices such as crop rotations, inter-cropping, symbiotic associations, cover crops, organic fertilizers, and minimum tillage are central to organic practices (Banjara and Poudel, 2017). Further, the incorporation of soil management techniques such as mulching, intercropping, and crop rotation are integral components of an organic farming system (Bello, 2008). An alternative important

characteristic of an organic farming system is the use of the agroforestry system. Organic farming combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life (Demeester et al., 2011). Some researchers stated that Organic farming is not only about the human welfare but also for the animal welfare and veterinary care too (Bello, 2008).

The traditional system of agriculture in Nepal was organic but with the change in time, the practices changed more towards inorganic, which is a direct threat to agriculture productivity, environmental quality, and human health. Organic agriculture is a very common word in the Nepali agriculture sector as farmers in hills and mountains are following the farming practice, which is similar to organic farming (Tamang et al., 2011). With the simple modification in the practices, farmers practicing will be easier to make the product organic. The existence of large coverage forest area in the hill and mountain regions makes the organic farming and integrated farming system possible (Banjara and Poudel, 2017). The study aims to explore the status and 'SWOT analysis (strength, weakness, opportunities, threats of organic farming in Nepal.

2. GLOBAL AND NEPAL SCENARIO ABOUT ORGANIC AGRICULTURE

About 37.431%o earth's land is occupied by agriculture. (<https://data.worldbank.org/indicator/AG.LND.AGRI.ZS>). Currently 1.4% of world agriculture land is organic (FiBL, 2019). according to the latest survey by the institute of organic agriculture FiBL and IFOAM (2017) 69.8 million hectares of organic agriculture land (including in-conversion areas) were recorded in 181 countries of the world. Table 1 shows regions with the most organic agricultural land in Oceania with 35.9 million hectares, followed by Europe with 14.6 million hectares, Latin America 8 million hectares, Asia 6.1 million hectares, North America 3.2 million hectares, and Africa 2.1 million ha.

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Table 1: World; Organic Agricultural Land(including in-conversion area) and regions share of the Global Organic Agriculture Land, 2017 (FiBL, 2019).

Region	Organic Agriculture Land in (hectares)	% share
Africa	2056571	3
Asia	6116834	9
Europe	14558246	21
Latin America	8000888	11
North America	3223057	5
Oceania	35894365	51
World	69845243	100

The percentage of area under organic farming in the world (Table 1) shows Australia (35.65%) in the first position followed by Argentina (3.39%) and China (3.02%) in the second and third positions respectively.

Table 2: Ten countries with the largest areas of organic agricultural land,2017 (FiBL, 2019)

S.N	Country	Percentage of the area under organic farming
1	Australia	35.65
2	Argentina	3.39
3	China	3.02
4	Spain	2.08
5	USA	2.03
6	Italy	1.91
7	Uruguay	1.88
8	India	1.78
9	France	1.74
10	Germany	1.37

The area of organic agriculture in 93 countries experienced an increase in area, while the decrease in the area was reported in 36 countries and in 40 countries organic agriculture area neither increases nor decreases. Over 2 million organic producers worldwide 80% of the producers are in Asia, Africa and Latin America with the most organic producers country is India followed by Uganda and Mexico. More than 57.8 millions of agriculture production were certified as organic (including areas in the process of becoming organically certified). According to a study, the countries with the largest organic markets include the US (approximately 44 % of the global market) followed by Germany (approximately 11%) and France (8%.) followed by higher per capita consumption in Switzerland, Denmark and Sweden (Willer and Lernoud, 2019). High demand for organic foods in Europe and North America has resulted in the import of organic foods from large farms in less-developed countries (Willer and Lernoud, 2015)

3. ORGANIC AGRICULTURE AND NEPAL

Organic agriculture is not a new system in the context of Nepal. Although 65.6% of Nepalese farming is engaged in Agriculture, farmers of hills and mountains are using traditional farming also similar to subsistence farming with lower productivity which is much similar to organic farming (Pokhrel and Pant, 2009). The certification process of organic products is lengthy, organically produced products do not concede as organic products.

Due to the conventional agriculture-based farming for increasing the production of the crops the use of fertilizers and pesticides is an increasing trend. A report on Study of national pesticide consumption statistics in Nepal, 2014 revealed that average national consumption of pesticides in terms of kg of active ingredient (a.i.) is 0.396 per ha in Nepal which is higher than the corresponding old value 142 gm/ha reported in 1995 but is lower than world average 0.500 a.i. kg per ha. The trend of pesticide use is increasing in Nepal by about 10-20 percent per year and expenses on pesticide in market-oriented vegetables and fruit production has been a major cost factor (Jasmine et al., 2008). Studies have shown that more than 90 percent of the total pesticides are used in vegetable farming (Atreya and Sitaula, 2010). Use of fertilizers, pesticides, and the presence of pesticide residues in food and environment is a matter of grave concerns of all the concerned parties towards organic farming.

In Nepalese agriculture, Organic agriculture was first appeared as one of the priority sectors, since the 10th Five Years Plan (2059/060-2063/064).

The national agriculture policy in 2061 clearly stated that the promotion of organic agriculture is only for export. organic farming is limited in the only export-oriented commodities such as apiculture, coffee, tea, large cardamom, ginger, etc, and a certain group of farmers (Acharya, 2019). Various institutes and individuals think that organic movement in Nepal is quite slow in motion due to a lack of clear vision of the government and distorted information flow from the different developmental projects. Out of 1.4% of world organic agriculture land Nepal shares 0.23% of the organic agricultural land. Nepal shares 9361 ha of world organic agriculture land out of more than 69 millions ha of organic land in which 804 ha of land is share of organic coffee production (Willer and Lernoud, 2019). Some products of Nepal like tea and coffee have already been certified as organic products and have good export returns (Khanna, 2016). The growth of world organic agriculture land of 10 years growth of Nepal was 1167 ha but the growth trend neither decreases nor increases from 2014 -2017 (FiBL, 2019).

4. SCOPE AND PROSPECTS OF ORGANIC FARMING IN NEPAL.

During the past two decades, Nepal's agricultural sector's production has increased by 3.2 percent with the contribution of the agriculture sector (agriculture, forest, and fisheries) to GDP is estimated to be 26.98 percent (Economic survey, 2019). Indigenous knowledge and traditional practice can make a valuable weapon for the contributions to organic food production in Nepal as much more effort would not be needed for providing awareness about organic products. Due to the lack of proper guidance on organic technologies and insufficient services by the local government, many farmers are facing problems in this regard. Most of the farms in remote and marginal areas are subsistence type. Organic farming is growing rapidly among Nepalese farmers and entrepreneurs, especially in low productivity areas, rain-fed zones, hilly areas and mountain areas of Nepal. Due to the unavailability of fertilizers on time farmers are using the local nutrient sources for the crop production which might be the option for organic farming.

There is no chemical fertilizer factory in Nepal which justifies the major concern to promote organic agriculture in Nepal. Different organic sources for supplying essential nutrients (Animal wastes, vermicompost, compost, green manures, bone and fish meal, biofertilizers different aerobic and anaerobic nitrogen-fixing organisms.) are available in different parts of Nepal for enhancing soil fertility. Bulluck et al. reported that organic fertility amendments enhanced beneficial soil microorganisms, reduced pathogen population, total carbon, and cation exchange capacity, and lowered down bulk densities, and reduced the carbon footprint thus improved soil quality. Organic manures, though having less nutrient concentration, contains many of the essential nutrients for plant growth and releases them slowly for a longer period (Pokhrel and Pant, 2009). Organic farming capable of sustaining higher crop productivity and improving soil quality. Various local innovations are available in our local farming communities which can be continued as a new technology for promoting organic farming.

Farmers of Nepal use different locally available botanical pesticides for controlling the pest. Locally available botanical pesticides include *Justicia adhatoda* (Ashuro), *Artemisia spp.* (Titepati), *Agave Americana* (Hattibar/Ketuke), *Acorus calamus* (Bhojo), *Xanthoxylum armatum* (Timur), *Meliazederach* (Bakaino). Others: Tobacco liquid, Mustard Cake (Pina), Cow urine, JHOL MOL, etc) for controlling different diseases and pest of crops (late blight of potato, tomato fruit borer, brinjal fruit and shoot borer). The research findings published in Scientific Books by Gaby Stroll, 1986 revealed that undiluted urine killed 95% of the aphids, 67% of the caterpillars, and 87% of the mites. The research suggests a mixture of 1:1 because undiluted urine causes slight damage to the plants. Too strong a solution can produce the burning of the leaves. Such information reveals that without the use of inorganic fertilizer, insecticides and pesticides, crop productivity and soil fertility can be maintained sustainably.

The market for organic products is not well developed and no market statistics are available in Nepal. However, some specialized markets have started selling organic products. Though, our market is the direct linkage with the two neighboring countries India and China, there is a monumental scope of delivering organic products. Consumers are now turning to organic food because they believe it to be tastier, as well as healthier, both for themselves and the environment. They are willing to pay for organic produce as much more people have become conscious about health and food safety so that the producers can get a higher return from the farm. Rooftop farming, kitchen gardening is getting popularity in urban areas. Almost, not all local governments are focusing on organic farming. Besides this, Karnali province had declared for focusing mainly on organic farming and organic products. Organic certification is increasing gradually as organic

agriculture is getting attention from development stakeholders in Nepal also result in higher producer prices as consumers are willing to pay a higher price for quality products (Bhat, 2009). Organic products thus can raise the income of producers and improve the quality of the life thus organic farming and will help in alleviating poverty include high premium, low capital investment, ability to achieve higher premium in the market, and the ability to use traditional knowledge.

5. CHALLENGES OF ORGANIC FARMING IN NEPAL

5.1 Converting a farm to organic is a multi-year process

To gain organic certification, farmers must prove that no prohibited substances have been used on the farm for at least three years, reducing the chance that the farm has residual contamination of crops, soil, or water. Organic farmers are required to maintain buffer zones between organic farmland and adjacent potential sources of water, chemical or genetic drift to prevent their crops from being contaminated by actions taken on nearby farms. Organic farmers may not sell crops grown in buffer zones as organic.

5.2 Lack of organic certification and certifying agencies

Certification and labeling systems serve as tools to enhance distribution and market development, create trust, and foster confidence (Hamzaoui-Essoussi and Zahaf, 2012). There are no government organizations to date to provide certification. Although various private are involving for certifying organic products, are lacking efficiency, accuracy, and is hard for local certification bodies to compete with international certification bodies in export certification. Certification is a great issue to tap the export market of organic products,

5.3 Low yield of crops

Kirchmann et al., however, reported that organic crop yields are 25–50% lower than conventional ones, which were mainly attributed to lower nutrient availability, poorer weed control, and the limited possibility to improve the soil nutrient status yields of organic agriculture are much less than conventional agriculture and that the current organic sources of nutrients are not enough to increase crop yields required to feed the global population (Timsina, 2018).

5.4 Lack of awareness

Though, Nepalese farmers are familiar with organic farming they are still unknown about the different procedures of organic farming. Modern technology of composting, vermicomposting techniques of making and using locally available biopesticides and biofertilizers are lacking in Nepalese farmers.

5.5 Non-availability and high input cost of organic sources

Nepal government had given the subsidies in chemical fertilizers so that the farmers can get fertilizers at a lower cost as compared to the organic sources. Eg. one can get one kg of urea below Nrs 20 but mustard cake cost is above 30-50 rupee depending upon the location. Chemical fertilizers and pesticides are easier to purchase and easily available in the market as compared to organic sources.

5.6 Plant protection measures

Organic crop protection (OCP) strategies using organic procedures are costly, time-consuming and often rely on a limited number of methods that provide only partial control of pests and weeds that induce lower yields and economic performances (Bellon and Penvern, 2014).

5.7 High C:N ratio and Low amount of nutrients and different organic residues

Wider C: N ratio. Organic residues if incorporated in the soil, will not be decomposed well and cause immobilization of nutrients. Organic nutrient sources contain lower nutrients which cannot meet the crop requirements

5.8 Transporting organic food

Transporting organic food products and keeping it separate from non-organic produce is one of the major challenges. Companies offering organic and non-organic food products have to use two different machines for each step of production to maintain organic food standards and practices. This increases production cost significantly.

5.9 Marketing problems

Producers have either had to sell directly or through the middle man. Direct selling is not common in the Nepali market almost not all the products should be sell through the middle man. Market for organic products is not well developed and no market statistics are available in Nepal.

5.10 Suggestions for promoting organic agriculture

1. Potential areas for organic farming should be identified through the benchmark survey
2. Certification programs should be promoted
3. Training programs for producers and certification agencies
4. Development of effective national policies and laws for organic promotion
5. Promoting Nepalese organic products in international fairs and promoting programs through the mass media to advise about organic farming and their benefits.
6. Expand the research in the areas of organic production, processing, packaging, and leveling
7. Establishment of organic college and university and include organic agriculture in the curriculum of school-level education
8. Information campaigns about the benefits of organic farming its products and importance should be encouraged by the local government, public administration, and central government.
9. The establishment of a multipurpose international accreditation quality control lab and organic fertilizer industry should be encouraged.
10. Allocation of sufficient budgets for organic farming should be promoted.

6. CONCLUSION

Organic farming is gaining popularity in Nepal. It is now the interest of all including the central government, local government, and people. High use of chemical fertilizers, pesticides, Genetically modified organisms, plant growth regulator had leads towards the negative impacts on the environment, health of the soil, human and animal. Many of the concerns of sustainability today is focus on environment and nature, animal welfare, product quality, and health are all fundamental aspect of organic farming still in Nepal are of traditional type and it will be easier to adopt the organic farming by simple modification. The adoption of organic farming can be an opportunity for rural employment and to alleviate poverty in Nepal. Certification problems are the issues for exporting the organic products of our country. Lack of effective policies and laws had distorted the expansion of organic agriculture. there is a need for research support to develop feasible and sustainable Organic agricultural techniques.

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