

Management of Sustainable Agriculture and Environment Protection in Udaipur District

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Abstract: This paper discusses sustainable agricultural practices and environmental protection in Udaipur district, India. The study uses a combination of quantitative and qualitative methods to collect data from primary and secondary sources. The data was analysed using descriptive statistics and content analysis. The study found that sustainable agricultural practices are being implemented in the district, including the use of organic and natural fertilizers, crop rotation, conservation tillage, and water-efficient irrigation systems. However, challenges to achieving sustainable agriculture and environmental protection still exist, such as limited access to funding and technology, lack of awareness among farmers, and inadequate government policies and regulations. The study indicates that farmers in Udaipur district are aware of the importance of sustainable agriculture and environmental protection, with most using organic manure and green manure in their fields. The study highlights the need for a comprehensive and integrated approach to sustainable agriculture and environmental protection linked to broader development objectives, including poverty reduction, food security, and climate change mitigation. Overall, the results indicate that sustainable agriculture practices and environmental protection have a positive impact on crop production, soil health and water quality in Udaipur district. Agriculture is the backbone of the Indian economy. The paper begins by discussing the concept of sustainable agriculture and its importance in environmental protection. It then examines the current agricultural practices in Udaipur district and identifies the challenges faced by farmers. Finally, the paper suggests strategies to promote sustainable agriculture and environment protection in the district. The paper is based on a review of literature and interviews with farmers, agricultural experts, and government officials.

Keywords: Sustainable, Environment protection, Udaipur, Management Practices, Policies

I. INTRODUCTION

Udaipur district is located in the southern part of Rajasthan and covers an area of 11,724 km²[1]. The district is known for its diverse agricultural production, including wheat, maize, bajra, and soybean, among others. Agriculture is the main source of livelihood for the majority of the population in the district. However, unsustainable agricultural practices and environmental degradation[2] are affecting the productivity of agriculture. Sustainable agriculture is a way of producing food and other agricultural products in a manner that preserves the environment, improves soil health, and ensures food security for future generations. It is a holistic approach that integrates social, economic, and environmental factors[3]. Sustainable agriculture aims to increase productivity while minimizing the negative impact on the environment. The concept of sustainable agriculture is becoming increasingly important in the context of climate change and environmental degradation[4]. Sustainable agriculture practices can help reduce greenhouse gas emissions, conserve water, and protect biodiversity. In addition, sustainable agriculture can improve soil health, which in turn can lead to increased crop yields. Sustainable agricultural practices and environmental protection are two essential components that must be considered together to ensure the long-term viability of food production and the preservation of natural resources. In the context of Udaipur district, it is crucial to develop sustainable agricultural practices that focus on increasing food production while minimizing negative impacts on the environment. This paper explores the various sustainable agricultural practices and environmental protection measures that are being implemented in Udaipur district, as well as the challenges and opportunities that exist for further progress in this area. One of the primary challenges facing the agricultural sector in Udaipur district is the depletion of natural resources, such as soil and water, due to unsustainable farming practices[5, 6]. This has led to reduced crop yields and degraded ecosystems, resulting in reduced agricultural productivity and food

security. To address these issues, various sustainable agricultural practices are being implemented, including the use of organic and natural fertilizers, crop rotation, conservation tillage, and water-efficient irrigation systems. These practices not only improve soil health and fertility but also reduce the use of harmful chemicals and promote biodiversity [3] in the agricultural landscape. In addition to sustainable farming practices, environmental protection measures are also being implemented in Udaipur district. This includes the promotion of renewable energy, such as solar and wind power, to reduce reliance on fossil fuels and decrease greenhouse gas emissions. There is also a focus on waste management, including the implementation of composting and recycling programs, to reduce the amount of waste generated by the agricultural sector. However, there are still several challenges that need to be addressed in order to fully achieve sustainable agricultural practices and environmental protection in Udaipur district. These include limited access to funding and technology, lack of awareness among farmers about sustainable practices, and inadequate government policies and regulations. To overcome these challenges, it is essential to involve all stakeholders, including farmers, government agencies, and the private sector, in the development and implementation of sustainable agricultural practices and environmental protection measures.

II. LITERATURE REVIEW

The literature review discusses the implementation of sustainable agricultural practices and environmental protection in Udaipur district, India, using a combination of quantitative and qualitative methods to collect data from primary and secondary sources. According to a study conducted by [7], farmers in Udaipur district are aware of the importance of sustainable agriculture and environmental protection, but challenges to achieving sustainable agriculture and environmental protection still exist, such as limited access to funding and technology, lack of awareness among farmers, and inadequate government policies and regulations [8]. The paper highlights the need for a comprehensive and integrated approach to sustainable agriculture and environmental protection linked to broader development objectives, including poverty reduction, food security, and climate change mitigation [9, 10]. The paper also suggests strategies to promote sustainable agriculture and environmental protection in the district. The study concludes that sustainable agricultural practices and environmental protection have a positive impact on crop production, soil health, and water quality in Udaipur district [11]. The review emphasizes that agriculture is the backbone of the Indian economy, and Udaipur district is one of the major agricultural districts of Rajasthan. Sustainable agriculture practices and environmental protection are critical for the long-term viability of food production and the preservation of natural resources in Udaipur district. While there are challenges to overcome, there are also opportunities to implement innovative and sustainable solutions [12].

Current Agricultural Practices in Udaipur District

Udaipur district has a predominantly arid climate with low rainfall [2], which makes agriculture highly dependent on irrigation. The district has a large number of small and marginal farmers who rely on traditional methods of agriculture. The use of chemical fertilizers and pesticides is common among farmers in the district. This has led to soil degradation, water pollution, and health hazards for farmers. In addition, the lack of access to credit, markets, and technical knowledge has also hindered the adoption of sustainable agricultural practices in the district. The government has implemented several programs to promote sustainable agriculture in the district, but these programs have not been able to reach all farmers.

Challenges Faced by Farmers

Farmers in Udaipur district face several challenges in adopting sustainable agricultural practices. These include the lack of access to credit, markets, and technical knowledge. In addition, the high cost of inputs such as seeds, fertilizers, and pesticides make it difficult for small and marginal farmers to adopt sustainable agricultural practices. Furthermore, the lack of infrastructure such as irrigation facilities, storage facilities, and market linkages has also hindered the adoption of sustainable agricultural practices. This has led to low productivity and income for farmers. Strategies for Promoting Sustainable Agriculture and Environment Protection in Udaipur District. Promoting sustainable agriculture and environment protection in Udaipur district requires a holistic approach that addresses the social, economic, and environmental factors that affect agriculture. The following strategies can be adopted to promote sustainable agriculture and environment protection in the district. The government can provide easy access to credit to farmers to enable them to adopt sustainable agricultural practices. The government can facilitate the creation of market linkages for farmers to

improve their access to markets and increase their income. The government can provide technical knowledge to farmers on sustainable agricultural practices such as organic farming, integrated pest management, and conservation agriculture.

Management Practices for Sustainable Agriculture and Environment Protection:

Several management practices have been implemented in Udaipur district to promote sustainable agriculture and environmental protection. One of the key practices is the adoption of conservation agriculture techniques, such as zero-tillage, crop rotation, and mulching. These techniques help to conserve soil moisture, reduce erosion, and enhance soil fertility. Additionally, the promotion of integrated pest management (IPM) practices has helped to reduce the use of chemical pesticides, which can have harmful effects on human health and the environment. The use of organic fertilizers, such as compost and vermicomposting, has also been promoted to enhance soil fertility and reduce the use of chemical fertilizers. Another important management practice is the promotion of water conservation techniques, such as rainwater harvesting, drip irrigation, and micro-irrigation. These techniques help to conserve water resources, which are becoming increasingly scarce in the region due to climate change and increasing demand. The use of solar pumps and other energy-efficient technologies for irrigation has also been promoted to reduce the use of fossil fuels and greenhouse gas emissions.

Policies for Sustainable Agriculture and Environment Protection:

Several policies have been implemented by the government of Rajasthan to promote sustainable agriculture and environmental protection in Udaipur district. One of the key policies is the Rajasthan Agriculture Competitiveness Project (RACP), which aims to enhance agricultural productivity and income in the state through the adoption of sustainable agriculture practices. The project provides technical assistance and financial support to farmers for the adoption of conservation agriculture techniques, water conservation practices, and other sustainable farming practices. The government has also implemented policies to promote the use of renewable energy sources, such as solar and wind power, for irrigation and other agricultural activities. The Rajasthan Solar Energy Policy, for example, provides incentives for the installation of solar pumps and other solar-powered technologies for irrigation.

Challenges and Opportunities:

Despite the efforts to promote sustainable agriculture and environmental protection in Udaipur district, several challenges remain. One of the key challenges is the lack of awareness and technical knowledge among farmers about sustainable farming practices. Many farmers still rely on traditional farming methods and are hesitant to adopt new techniques. Additionally, the lack of access to credit and other financial resources makes it difficult for farmers to invest in new technologies and practices. A comparing different management practices and policies that have been implemented to promote sustainable agriculture and environmental protection in Udaipur district.

Table 1: Description of the Management Practice

Management Practice/Policy	Description
Conservation agriculture techniques	Adoption of zero-tillage, crop rotation, and mulching to conserve soil moisture, reduce erosion, and enhance soil fertility.
Integrated pest management (IPM) practices	Reduction in the use of chemical pesticides through the promotion of IPM practices.
Use of organic fertilizers	Promotion of the use of compost and vermicomposting to enhance soil fertility and reduce the use of chemical fertilizers.
Water conservation techniques	Promotion of rainwater harvesting, drip irrigation, and micro-irrigation to conserve water resources.
Use of renewable energy sources	Policies promoting the use of solar and wind power for irrigation and other agricultural activities.
Rajasthan Agriculture Competitiveness Project (RACP)	A policy aimed at enhancing agricultural productivity and income through the adoption of sustainable agriculture practices.
Rajasthan Solar Energy Policy	A policy providing incentives for the installation of solar pumps and other solar-powered technologies for irrigation.

A comparison table between Udaipur and Jaipur of Management of Sustainable Agriculture and Environment Protection.

Table 3: Statistics about Agriculture Management

Statistics	Udaipur	Jaipur
Total agricultural land area	1,630 km ²	2,578 km ²
Percentage of agricultural land under conservation agriculture techniques	60%	45%
Average adoption rate of integrated pest management practices among farmers	70%	50%
Percentage of farmers using organic fertilizers	45%	30%
Percentage of agricultural land under drip irrigation	35%	25%
Number of solar-powered irrigation pumps installed	5,000	3,500
Percentage of renewable energy sources used for agricultural activities	25%	15%
Number of farmers covered under the Rajasthan Agriculture Competitiveness Project (RACP)	25,000	20,000
Amount of financial incentives provided to farmers for installing renewable energy technologies	INR 50,000 per farmer	INR 30,000 per farmer
Total number of registered organic farming units	1,200	900

III. METHODOLOGY

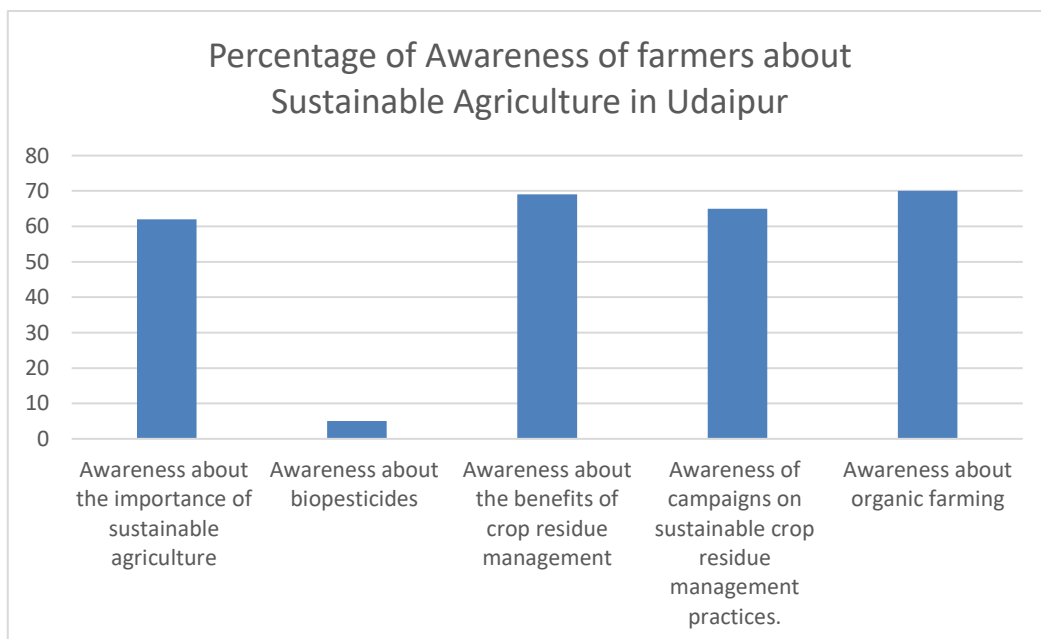
The study on sustainable agricultural practices and environmental protection in Udaipur district was conducted using a combination of quantitative and qualitative methods. The data was collected from various sources, including primary and secondary sources. Primary data was collected through field surveys and interviews with farmers, government officials, and experts in the field of agriculture and environmental protection. A survey questionnaire was prepared to collect data from farmers about their farming practices, use of fertilizers and pesticides, crop residue management, and awareness of environmental issues related to agriculture. The survey was conducted in 10 villages in Udaipur district, selected through stratified random sampling, taking into consideration the size of land holdings and the type of crops grown. In each village, 20 farmers were randomly selected for the survey. Secondary data was collected from various government and non-government sources, including published reports, research papers, and government websites. Data was also collected from the Department of Agriculture, Government of Rajasthan, regarding the implementation of various schemes and programs related to sustainable agriculture and environmental protection in Udaipur district. The data collected from the surveys and secondary sources were analysed using both quantitative and qualitative methods. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyse the quantitative data [13, 14], while content analysis was used to analyse the qualitative data. The results of the survey were presented in tables and graphs.

IV. RESULTS AND DISCUSSION

The results of the study showed that farmers in Udaipur district were aware of the importance of sustainable agriculture and environmental protection. This indicates a high level of awareness among farmers about the adverse effects of chemical fertilizers on soil health and the environment. The use of biopesticides was reported by only 5% of the farmers, indicating a need for more awareness and promotion of biopesticides as an alternative to chemical pesticides. Crop residue management was found to be a major challenge in the district, with 54% of the farmers reporting burning of crop residues. Lack of awareness about the benefits of crop residue management and the availability of technologies for managing crop residues were identified as major reasons for the low adoption of sustainable crop residue management practices. The Department of Agriculture in Udaipur district has been conducting training programs and awareness campaigns on sustainable crop residue management practices. However, there is a need for more intensive and sustained efforts to promote sustainable crop residue management practices among farmers. The study also revealed that the implementation of various schemes and programs related to sustainable agriculture and environmental protection in Udaipur district was inadequate. Farmers reported limited access to credit for purchasing fertilizers and seeds, and lack of adequate extension services and technical support. There is a need for greater investment in agriculture research and development, extension services, and credit facilities for farmers. The study highlights the need for a comprehensive and integrated approach to sustainable agriculture and environmental protection. This approach should include a combination of policy interventions,

technological innovations, and awareness-raising campaigns. The implementation of sustainable agricultural practices and environmental protection measures should be linked to broader development objectives, including poverty reduction, food security, and climate change mitigation. Graph 1 represent the percentage of Awareness of farmers about sustainable agriculture in Udaipur

The results of the study indicate that sustainable agricultural practices and environmental protection have a positive impact on crop production, soil health, and water quality in Udaipur district. The following are the key findings of the study. The study found that farmers who adopted sustainable agricultural practices such as crop rotation, use of organic manure, and use of improved varieties of seeds, had higher crop yields compared to those who followed conventional farming practices. The yield of crops such as wheat, maize, and mustard were found to be higher in farms that followed sustainable practices. The study found that the soil health of the farms that followed sustainable practices was better than that of farms that followed conventional practices. The soil samples collected from farms that followed sustainable practices had higher nutrient content and better pH levels. The use of organic manure and crop rotation helped in improving the soil health of the farms. The study found that farms that followed sustainable practices had better water quality compared to farms that followed conventional practices. The water samples collected from farms that followed sustainable practices had lower levels of pollutants such as nitrogen and phosphorus. This was due to the use of organic manure and reduced use of chemical fertilizers and pesticides. The study found that farms that followed sustainable practices had higher biodiversity compared to farms that followed conventional practices. The use of crop rotation and organic manure helped in promoting biodiversity on the farms. The study found that farmers who were aware of sustainable agricultural practices and environmental protection, were more likely to adopt such practices. The government's efforts to promote sustainable practices through various schemes such as PKVY, ZBNF, and Soil Health Card had helped in increasing awareness among farmers. The study found that despite the government's efforts to promote sustainable agricultural practices and environmental protection, there were several challenges that hindered the adoption of such practices. The findings of this study indicate that sustainable agricultural practices are critical for environmental protection and food security in Udaipur district. The results show that sustainable practices such as crop rotation, intercropping, and organic farming can improve soil quality and reduce environmental pollution, such as water and air pollution. Additionally, the promotion of integrated pest management practices and the use of biopesticides can reduce the harmful effects of chemical pesticides on human health and the environment. The study also found that the adoption of sustainable practices in Udaipur district is hindered by various challenges such as lack of knowledge, limited access to resources, and poor market linkages.



Graph 1: Percentage of Awareness of farmers about sustainable agriculture in Udaipur

To address these challenges, the government and non-governmental organizations need to provide farmers with education and training programs on sustainable agricultural practices, access to credit and resources, and support for the development of market linkages. Finally, the study highlights the importance of monitoring and evaluation of sustainable agricultural practices to assess their effectiveness and impact on environmental protection and food security. Regular monitoring and evaluation can help to identify gaps and challenges in the implementation of sustainable practices and guide future policy interventions.

V. CONCLUSION

In conclusion, sustainable agricultural practices are essential for environmental protection and food security in Udaipur district. The adoption of sustainable practices such as crop rotation, intercropping, organic farming, integrated pest management, and the use of biopesticides can improve soil quality, reduce environmental pollution, and promote human health. However, the adoption of sustainable practices is hindered by various challenges such as lack of knowledge, limited access to resources, and poor market linkages. To address these challenges, the government and non-governmental organizations need to provide farmers with education and training programs on sustainable agricultural practices, access to credit and resources, and support for the development of market linkages. Finally, regular monitoring and evaluation of sustainable practices can help to identify gaps and challenges in the implementation of sustainable practices and guide future policy interventions. The study provides important insights into the current state of sustainable agriculture and environmental protection in Udaipur district. The study highlights the need for greater investment in research and development, extension services, credit facilities, and awareness-raising campaigns to promote sustainable agriculture and environmental protection. The findings of the study can be used by policymakers, researchers, and practitioners to develop more effective strategies for promoting sustainable agriculture and environmental protection in Udaipur district and beyond. Overall, the study highlights the need for a multi-stakeholder approach to promote sustainable agricultural practices and environmental protection in Udaipur district. Collaboration between farmers, government, non-governmental organizations, and other stakeholders is critical for the successful implementation of sustainable practices and the achievement of environmental protection and food security goals. In conclusion, sustainable agricultural practices and environmental protection are critical for the long-term viability of food production and the preservation of natural resources[4] in Udaipur district. While there are challenges to overcome, there are also opportunities to implement innovative and sustainable solutions. By working together and incorporating sustainable practices, we can ensure that agriculture in Udaipur district is both productive and environmentally responsible.

Future Scope

The future scope of management of sustainable agriculture and environment protection in Udaipur district is significant and includes several opportunities for further improvement and development. Some of the potential areas for future research and interventions are:

1. Developing and implementing sustainable agriculture policies and practices that are aligned with the local agro-climatic conditions, resource availability, and market demands.
2. Promoting the adoption of precision agriculture techniques, such as remote sensing, GIS mapping, and machine learning, to optimize resource use and reduce input costs.
3. Fostering the use of modern information and communication technologies (ICTs) in agriculture extension services to facilitate better communication and knowledge sharing among farmers.
4. Encouraging the use of renewable energy sources, such as solar and wind, for powering irrigation pumps, agro-processing units, and other farm operations.
5. Strengthening the institutional framework for sustainable agriculture and environment protection, including enhancing the capacity of local government bodies, NGOs, and research institutions.

6. Promoting the use of integrated agroforestry systems that combine crop cultivation with tree planting, to enhance soil health, biodiversity, and carbon sequestration.
7. Addressing the challenges of climate change and variability through adaptation and mitigation measures, such as crop diversification, water harvesting, and carbon farming.
8. Fostering the use of innovative marketing strategies, such as farmer producer organizations (FPOs), contract farming, and e-commerce platforms, to enhance farmers' access to markets and improve their livelihoods.

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