Modern Practices and Indigenous Knowledge on Agriculture and Farming System in the State of Goa

Dissertation submitted in partial

Fulfilment of the Goa University for the Degree of Masters of Library and Information Science

By

Tejaswini Sadashiv Velkar

Enrolment Number

22P034018

Under The Supervision of

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Presented for Viva-Voce on 28/4/2023

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CERTIFICATE

This is to certify that the work incorporated in the dissertation entitled **"Modern Practices and Indigenous Knowledge on Agriculture and Farming System in the State of Goa"** is the bonafide work carried out by **Tejaswini Sadashiv Velkar**, in partial fulfilment of the requirement of the degree of Masters of Library And Information Science of Goa University is her own work carried out under the guidance and worthy of examination.

Novelty Ramesh Volvaikar

Research Guide

Library and Information Science Programme,

Goa University

DECLARATION

I declare that this dissertation entitled "Modern Practices and Indigenous Knowledge on Agriculture and Farming System in the State of Goa" submitted by is my original contribution and the same has not been submitted on any occasion for any other degree or diploma of this University or other University/Institute. To the best of my knowledge, the present study is the first comprehensive work of its kind from the area mentioned. The literature related to the problem investigated has been cited.

Tejaswini Sadashiv Velkar
Library and Information Science Programme
Goa University

Date:

Place:

ACKNOWLEDGMENTS

I am really grateful to all those who have helped me in completing this dissertation.

Firstly I would say I am fortunate enough to work under the able guidance of my professor, Novelty Ramesh Volvaikar. Her sincere and continuous support was vital for this dissertation. It has been a great experience researching under her guidance.

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Tejaswini Sadashiv Velkar

Table of Content

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1.1 Introduction

Farming is one of the oldest and most important professions in the world. It is the process of cultivating crops and raising animals for food, fibre, and other products. Throughout history, humans have developed a variety of farming techniques and practices to increase yields, improve soil health, and protect the environment.

Farming techniques and practices have evolved over time, and are often influenced by factors such as climate, geography, and culture. In general, there are two main types of farming: traditional and modern.

Traditional farming techniques are typically low-input and labour-intensive and rely on methods that have been used for centuries. These techniques are often used by small-scale farmers in developing countries who have limited resources and access to modern technology. Traditional farming practices may include crop rotation, intercropping, and the use of natural fertilizers such as manure and compost.

Modern farming techniques, on the other hand, are often high-input and technology-driven. These techniques are used by large-scale commercial farmers in developed countries who have access to advanced machinery, fertilizers, and pesticides. Modern farming practices may include monoculture farming, genetically modified crops, and precision agriculture.

Despite the differences between traditional and modern farming techniques, there are certain practices that are common to both. One of the most important is soil conservation. Farmers must take steps to prevent soil erosion and degradation, which can lead to reduced yields and environmental damage. This may involve practices such as conservation tillage, cover cropping, and the use of contour farming.

Another important practice is pest management. Farmers must protect their crops from pests such as insects, weeds, and diseases. This can be done through a variety of methods, including crop rotation, biological control, and the use of pesticides.

However, it is important to use pesticides judiciously to avoid negative impacts on human health and the environment.

Water management is also critical for successful farming. Farmers must ensure that their crops receive adequate water, but also prevent excess water from causing soil erosion and nutrient runoff. This may involve practices such as irrigation, drainage, and the use of water-conserving technologies.

Finally, farmers must be aware of the environmental impacts of their practices. This includes not only the impacts on soil, water, and air quality, but also on biodiversity and climate change. Sustainable farming practices are those that aim to minimize these impacts and promote long-term environmental health.

In conclusion, farming techniques and practices are essential for producing the food and other products that we rely on. Traditional and modern farming methods each have their own strengths and weaknesses, but all farmers must prioritize soil conservation, pest management, water management, and environmental sustainability. As we face challenges such as climate change and a growing global population, it is more important than ever to develop and promote sustainable farming practices.

1.2 Goa at a Glance

Goa is India’s smallest State by area and the fourth smallest by population. Located in South West India in the region known as the Konkan, bordered by the to its North and East are the states of Maharashtra and Karnataka and South, with the captivating Arabian Sea along its West Coast. The Indian state of Goa is home to a wide range of resources that are born there in the state's extensive woods. Despite being Goa's smallest state, it is equipped with stunning natural scenery, waterfalls, temples, and other. It's a fantastic place to dive in because of the wonders of nature. The Goan soils are lateritic in composition. It is an international tourist destination in India since the temperature is not changing significantly. The However, the weather is lovely and warm. The rainy season runs from the month of June through September in the state. The Along the eastern side of the Western Ghats region, state and is made up of a broad band of dense woodland, with plenty of biodiversity in plants and animals. In the Western Ghats, most of eastern Goa have been internationally recognised regarded

as one of the world's biodiversity hotspots. Goa is home to one national park and seven animal sanctuaries. Major wildlife in the state. 34 percent of Goa's geography government forests, of which approximately 62% are included into protected areas of wildlife sanctuaries and national park. Despite its declining economic importance over the past forty years, agriculture nevertheless provides a sizable segment of the population with part-time work. Rice is the main agricultural crop, followed by Areca, Cashew and Coconut. This has happened as a result of people's disregard for agriculture and their refusal to work hard in this area. The second source of employment is in the industrial sector, which is home to some of India's most well-known businesses. Forty thousand people are employed in the fishing sector. Recent official statistics show a loss in this sector's importance and a drop in catch, which may be related to the substitution of large-scale mechanised trawling for traditional fishing. The main economic sector of Goa is tourism. 12% of all international visitors to India are handled by it. A seasonal aspect of tourism exists. Along with tourism and agriculture, iron-ore and manganese mining also helped the state bring in a sizable sum of foreign currency. The economic exploitation of the country's mineral reserves has been boosted by advantages like the natural harbour and navigable perennial rivers. The state's mining sector has a distinguishing quality that gives it an advantage over other mining regions in the nation: the ability to transport ores at the lowest possible cost when compared to other forms of transportation. Because of this, Goa now exports the majority of the nation's iron ore. Since several decades, the state's agriculture and wildlife have been negatively impacted by the annual iron ore mining average of roughly 15–16 million tonnes. (Talule & Naik, 2014)

1.3 Need For The Study

To understand Agriculture and its traditional methods and to help farmers and society.

1.4 Objectives

1. To explore Traditional Agriculture system and farming methods in Goa.
2. To identify the constraints faced by farmers in adopting traditional farming methods.
3. To explore biodiversity crops that is found in Goa.
4. To document the Traditional Knowledge regarding the agriculture/ farming techniques and system.
5. To assess the need for training Farmers.

1.5 Hypothesis

1. Traditional ways of farming methods are declining.
2. A farmer feels the need of a workshop/training to be conducted by concern department.

1.6 Scope and Limitations of the Study

1. The scope of current study is limited to the indigenous Knowledge with respect to farming and agricultural system in selected areas in the state of Goa.

1.7 Research Methodology

A. Population

The population will include local farmers in the selected area of the state of Goa.

The concern department related to farming and agriculture will be approached for finding document information regarding farming techniques of Goa.

B. Method

A structural questionnaire and interview methods will be followed for the collection of data.

1.8 Organisation of the Study

Chapter I- Introduction
Chapter II- Literature Review
Chapter III- Indigenous / Traditional knowledge concept
Chapter IV- Data analysis and interpretations
Chapter V- Major Findings and Suggestions
Chapter VI- Conclusion
Chapter VII- Reference

1.9 Conclusion

Indigenous knowledge has its roots in indigenous peoples' interactions with environment and their communities. If the indigenous crops are well-preserved, traditional knowledge loss has already increased the susceptibility and risk for indigenous populations. It is crucial that the national and local communities begin to acknowledge indigenous peoples and their expertise because it is obvious that this information is crucial to the growth of agriculture and various farming methods.

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2.1 Literature Review

1. Priyamwada Joshi, (PJOSHI, 2013) had conducted study based on preserving traditional knowledge on Human Viral diseases A major component of this is ethno botanical knowledge. How local people perceived managed and utilized Traditional knowledge around them. It tells about urgent need to preserve, organise, and disseminate traditional knowledge on human viral diseases by using library and information technology and help scientist and other concerns.

2. Awatade Sudarshan Chandrakant (AWATADE, 2020) in Agricultural extension reveals how agriculture scenario has changed with increasing population. Extension service is renowned for facilitating flow of information and transfer of knowledge and scientific findings which helps in improvement of production and processing.

3. According to Deshpande (2017) (AWATADE, 2020) factors affecting agricultural productivity include an increase in small or marginal land holdings (from 36 million in 1971 to 93 million in 2011), poor access to agricultural credit and insurance, a lack of water (49% of agriculture is still dependent on rainfall), a low level of micro irrigation technology adoption, an imbalance of nutrients in the soil, an imbalance in the use of fertilisers, and a high price for high-quality or genetically modified crops.

4. (U K Behera; V Paramesh ; A, Kumar, 2019)In order to evaluate the economic benefits of two widely used agricultural systems, a study was carried at the coastal environment of Goa with farmers from various communities in North Goa and South Goa. In this study, the Indigenous Kulagar Farming Systems (IKFS) and the Integrated Farming Systems (IFS) were compared.demonstrated that both are beneficial for improving small and marginal farmers' livelihoods, drew in the rural youth through the creation of extra money and job prospects. The IKFS must be changed to include The system can be made more lucrative and alluring by integrating high-value

crops and by having a strong market demand. In Goa state, the IFS and IKFS have been crucial to the state's economy and to farmers' means of subsistence.

5. (BAHAGIA, RIMUN WIBOWO, FACHRUDDIN MAJERI MANGUNJAYA, OKING SETIA PRIATNA, 2020) Indigenous Urug people possess traditional knowledge that allows them to forecast both the dry and wet seasons of the climate. The dry season starts when the Kidang constellation rises in the east. On the other hand, the rainy season arrives when the star is in the west. The village will begin growing rice and other plants when the star Kidang is in the west, which is the significance of the star's emergence. The position of the Kidang star shifts to the East as harvest time approaches. All of the agricultural machinery had started to be stored at that point. Pests then appeared, but because the rice harvest had already been finished, insects were unable to harm the soil.There are many guidelines for protecting ecosystems, starting with gunung kayuan (no damage to any mountain areas), lamping awiyan (bamboo planting in every valley), and legok balongan (watery area must be preserved). The indigenous people of Urug protect forests by establishing awisan forests and prohibited forest (hutan larangan) zones where no one is permitted to harm the forest. Rice has never been grown twice or three times a year by indigenous people. The Urug people are aware that the more land is planted, the more soil fertility is lost and in order to restore soil fertility, the earth requires a respite from planting.

6. (Ansaria, Sharmaa, Roy, & Ramakrishna, 2021) If not documented, indigenous knowledge is presumed to be forgotten. Because of this, many indigenous knowledges that have produced results in one Similarly, the terms "society" or "community" another society's or community's agroecosystem. As a result, recording indigenous knowledge assist in comparing and differentiating with system of knowledge on a global scale. via contemporary scientific innovation, improvement of the useful an element of the indigenous knowledge system made. therefore, traditional wisdom and modern scientific approaches could be combined to create a "technology" combining for advancement or innovation, among other things technology that works. Despite the growth of agricultural

science and indigenous peoples Farming still employs knowledge-based procedures communities in remote, resource-poor areas without scientific validation. Consequently, it is crucial that you do scientific study to develop practical comprehension of identification is part of indigenous knowledge. gathering and evaluating such local technical expertise. Only by doing so will the documentation and validation for protection of our ancient indigenous technical knowledge as a whole be assured.

7. (Parvaiz, Ahmad Lone; Bhardwaj,Ajay Kumar; Fayaz Ahmad Bahar, 2013) The current loss of medicinal plants in the country due to natural and anthropogenic factors links with the missing of valuable traditional knowledge associated with the plants. The Bandipora district is rich in essential medicinal plants and has thick forests that are full of natural beauty. The locals have long relied on plants for a variety of other uses and have employed medicinal plants to treat a variety of illnesses. Through the use of questionnaires, in-depth interviews with local experts, "Bhoris," tribal healers, and field trips, information about the traditional medicinal applications of plants was gathered. A total of 34 medicinal plant species from 24 distinct families and similar numbers of genera were discovered to be utilised regularly by the locals as efficient treatments for a variety of human and animal illnesses.

8. (Kannan,Vinoth; Rangarajan,Vivek; Manjare,Sampatrao D.;Pathak,Pramod V., 2021)For ongoing growth, cashew farming—one of the most lucrative agricultural industries—needs new methods for processing its byproducts and products. By outlining value-addition tactics using microbial fermentation pathways that can help the growers increase their profits, the current analysis demonstrates the commercial potential of cashew apples. The enormous potential of cashew apples and pulp leftovers from juice extraction to produce a variety of goods through fermentation, including bioethanol, hydrolytic enzymes, lactic acid, biosurfactants, wine, and Feni. In addition, a case study of the current Feni-making procedures in Goa, India, is examined, and the requirement for improvements in the processing techniques is stressed. Cashew farming is only feasible when holistic cultivation and proper utilisation of wastes and its management of cashew apples. This is based on the literature survey and the

knowledge on cashew industries that was gathered through visits to various cashew farming sites. Additionally, considerable improvements in processing techniques are needed for Feni production, the backbone of India's current cashew processing business, in order to increase its quality, marketability, and export potential.

9. (Gurjar, 2015)From the study it was concluded that mostly While working in agriculture, women farmers encountered a number of challenges. They include the following categories: physical, chemical, occupational, seasonal, biological, and others. Inappropriate use of equipment or machinery is a major contributor to injury frequency and mortality rates, as well as a lack of awareness. A significant source of occupational risk that can cause poisoning, in some cases even death, and reproductive harm is exposure to pesticides and other agricultural chemicals. Weather exposure, intimate contact with plants or animals, and prolonged working hours and posture are dangerous. Disease and accidents related to agricultural work are also influenced by a number of variables, including the climate, poisonous plants and insects, population density, living conditions, lack of tool knowledge, lack of education and training, technological advancements, the calibre of services, etc.
10. (H.C. Chhodavadia ; N.S. Joshi; V.S. Parmar ;M.L. Patel ; P.J. Prajapati, 2018) The operational region of the Krishi Vigyan Kendra in the Amreli district served as the site for the current study. Five talukas were randomly chosen out of a total of 11. Two villages will be chosen at random from each of the five talukas out of the total of five. Ten Farmers from each of the chosen villages were chosen for the study. 100 respondents in all were chosen for this study as a result. According to the study, the majority of respondents need instruction in vermicomposting for fertilisers, improved kinds and hybrids of various crops for seeds, effective pesticides for controlling disease and insects, and finally, subsidies and loans for farm equipment and tools.
11. (Ramasamy Selvaraju; Holger Meinke ; James Hansen, 2004)Seasonal climate forecasting, agricultural systems analysis based on simulation models and a participatory decision making approach has resulted in better-informed decision-making of smallholder farmers in India.
12. (Sajeev, M. V.;Singha, A.K .;Venkatasubramanian, V., 2012)The findings showed that even in the most well-liked training regions, Manipur's Krishi Vigyan

Kendras were not providing enough training frequently enough. This is clear from the fact that farmers sought for the most trainings on integrated pest and disease management, integrated farming systems, and technologies for soil and water conservation, which were also discovered to be the most often occurring training topics in KVKs. The tendency was similar in the horticulture industry as well, with nursery management at the top of the list followed by methods for cultivating fruit-bearing plants, such as the design and administration of orchards. Training requirements in the field of animal sciences also indicated a need for the most typical occupation, which is pig farming, followed by disease prevention and treatment. The findings demonstrate that despite significant efforts to train farmers in common occupations and areas of interest, there is still a gap that has to be filled. Based on these findings, the KVKs must refocus their training in order to close the gap in the delivery of need-based training in the various Manipur districts.

13. (Mundy & Compton, 1991)Most traditional knowledge is oral and not recorded. It is kept in people's minds and verbally transmitted from one generation to the next. However, how is this information disseminated? How are indigenous knowledge systems taught to people? The organisation of the communication. We don't have many solutions for these queries. Entertainment, news, persuasion, announcements, and all forms of social interaction are all forms of indigenous communication. Although these issues are significant, this article focuses on the dissemination of technical information because it is related to the interest developing using indigenous knowledge.
14. (Rifat Haneef ; Gyanendra Sharma; Taufiq Ahmad, 2019) Despite being the best remedy for the environmental difficulties that conventional farming has caused in India today, including climate change, health problems, and sustainability challenges, organic farming is growing quite slowly in that country. Small farm owners who practise organic farming in hilly areas confront a variety of challenges. They were mostly affected by economic and marketing issues, such as the first low price for organic products, a lack of specialised markets, initial production losses, and high transportation costs. With the right interventions, these restrictions must be removed. The state's extension services should be effective and should enlighten farmers about all facets of organic farming.

15. (Chhetry & Belbahri, 2009)The traditional farming system was created by ancient farmers through generations of interaction with environment and natural resources for food, fodder, and fibre. It is a time-honored farming method with an ecological foundation. Indigenous knowledge is the information held by indigenous people who live in various parts of the world and have developed their own language, culture, tradition, beliefs, folklore, rites of passage, and religious beliefs. The purpose of this paper is to provide a record of some of the indigenous methods used by traditional farmers in north-eastern India and elsewhere to manage pests that affect several popular crops grown there.
16. (Al-Roubaie, 2010)The purpose of this paper is to emphasise the value of Indigenous Knowledge (IK) in development. The research focuses on the part that IK and regional cultural values play in the growth process. Currently, industrialised countries produce the knowledge, information, science, and technology needed for development without taking into account how those things would affect the local environment. IK creates a harmonious link between the social structure and the environment in any given developing country, despite the fact that it is frequently practised in short shirts. In order to assist IK and maintain development, access to global information is essential.
17. (Lodhi & Mikulecky, 2010)Indigenous knowledge describes a sizable amount of knowledge and abilities that have been produced outside of the traditional educational system. It is ingrained in culture and particular to a location and its culture. Although numerous authors have written extensively about the value of indigenous knowledge, its management is still missing. However, managing indigenous knowledge can be crucial for the health and food security of millions of people in underdeveloped nations. The emphasis of this study, which focuses on the topic of indigenous knowledge management, is on the position and requirements of emerging nations.
18. (Tikai & Kama)This research covers indigenous knowledge on farming tasks such as managing soil fertility, controlling pests and diseases, controlling weeds, soil preparation, planting materials, harvesting and storage of indigenous root crops and animals in Samoa. They conclude that indigenous knowledge should be recorded and used to devise innovative research for agricultural researchers, extension workers, development practioners, and environmentalists for sustainable agriculture development and management of Samoa's natural resources.

Understanding and conserving Indigenous Knowledge will help to sustain farming practices which will not cause so much plant genetic erosion and environmental deterioration.

19. (Kavita Bhadu; Rakesh Choudhary; Tanuja Poonia; Payal Patidar; KM, 2018)This paper reviews the emerging concerns due to continuous adoption of conventional agriculture systems, Benefits of conservation agriculture and analyses the constraints of conservation agriculture in India As a result of pervasive resource degradation issues that came along with previous production-enhancing tactics that showed little regard for resource integrity, a change to CA has become necessary. By lowering cultivation costs, improving resource use efficiency, competitiveness, and sustainability in agriculture, conservation agriculture provides a chance to halt and reverse the downward spiral of resource degradation. It's important to change people's attitudes toward tillage because, despite the enormous benefits of CA, there are significant barriers to its implementation. Extensive educational programmes that highlight the advantages of conservation agriculture are required to fully transition from heavy tillage to zero or low tillage.
20. (MOYO, 2009)The evolution of farming techniques that incorporate both indigenous and Western knowledge is the subject of this paper. It describes how farmers in Malawi's Zombwe Extension Planning Area reconfigure their farming practises combining indigenous and Western knowledge in a way that satisfies their needs and goals while making use of the resources at hand. The paper examines how modernity, development, and progress are contentious concepts that have different meanings to farmers and agricultural specialists, drawing on data from field research.
21. (Shelke, Kulkarni, & Kawale, 2021)Post-harvest losses of food grains are due to unscientific storage, insects, rodents, micro- organisms etc. In Goa, though the Production is less the food grains are stored for home consumption throughout the year. The climatic condition of Goa is hot and humid which is favourable f or the incidence of several stored grain pests. Major stored grain pests observed in Goa are Rice weevil, Rice moth in cereals i.e. in paddy and nagali, Pulse beetle in cowpea and other stored pulses, Red rust flour beetle in flour or suji. The increasing public awareness of the environmental contamination by toxic chemical residues has necessitated the research and development of non-chemical

methods of pest management. Traditional agricultural practices have profound effect on modern day agriculture. Therefore, the purpose of this research was to learn about the traditional post-harvest storage methods employed by Goan farmers. Farmers have created a number of storage facilities, such the Mudi, Vurlo, Kado, and Kadtari, which are used to store agricultural products in a safer manner. In order to store seed grain for a longer period of time, local farmers employ ash and other plant-based products as additives.

22. (Matsui, 2015)Traditional wisdom has been viewed by many academics and UN organisations as a substitute for science in environmental management. This method of thinking has been embraced by numerous nations, who have also developed some policy ideas. Numerous academics have also conducted traditional knowledge research and published their findings. There have been many publications on traditional knowledge, but there doesn't seem to be any agreement on what it is or how it may help with environmental management. In order to better understand the fundamental challenges underlying the definition of conventional knowledge, this essay first examines this definition difficulty within a historical perspective. The discussion then turns to how conventional knowledge can be verified by parties with two different interest and policy can be more effectively implemented in policy-making arenas.
23. (Sawaiker, 2021)The paper discusses a case study of Curtorim village of Goa where local people have documented the bioresources. The outcome of People's Biodiversities Registers validation process has resulted in declaration of flagship species in villages, promotion of traditionally grown rice varieties by giving brand name with the initiative of Goa State Biodiversity Board, reviving the age old cultures etc.
24. (Talule & Naik, 2014)Mainly the attempt in the present paper is made to focus on the impact of mining on agricultural and biodiversity of the state of Goa located in the south western part of India. Goa being one of the mineral endowed states in India and the state with no specific mining policy laid down has to face the adversaries of an indiscriminate mining practiced for several decades.
25. (Jha, 2022)The book Traditional Knowledge System in India has been organized around two interrelated themes: the diverse cultural contexts of scientific discovery and invention in ancient and medieval Indian history; and revision of the conventional Euro-centric view of science and its origins. The issues dealt

with in the various chapters are an assorted combination of those Traditional Knowledge Systems, whose origins are traced to ancient India. The basic idea of this work is an interdisciplinary and comprehensive exploration of the scientific, philosophical and cultural heritage of India. The book will be useful to all those who wish to know about the Traditional Knowledge System and incorporate it in their pursuits.

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3.1 Concept and Ideas

3.2 Knowledge

Knowledge is information and understanding about a subject which a person has, or which all people have. (Collins) It is a state of knowing about or being familiar with something. Knowledge is a awareness of or idea about something, which a person gains by experience or study or by listening. It makes you interpret something in a particular way.

3.3 Traditional knowledge

Definition

Traditional knowledge system or indigenous knowledge system is a body of knowledge, which is very ancient and deep rooted. It has its origins in the remote past; its systematisation and canonisation gave rise to the elite (the greater tradition) science. (Jha, 2022)

Traditional knowledge refers to the understandings, discoveries, and customs of indigenous and local groups all over the world. Traditional knowledge is passed down orally from generation to generation and is developed from experience accumulated over many years and fitted to the local culture and environment. It typically consists of tales, songs, folklore, proverbs, cultural ideals, rituals, and regulations as well as local dialects and agricultural techniques, such as the creation of plant and animal breeds. Since it has been practiced, sung, danced, painted, carved, chanted, and performed for millennia, it is occasionally described to as an oral tradition. Traditional knowledge is primarily of a practical nature, especially in areas like agriculture, fishing, health, horticulture, forestry, and environmental management in general.

3.4 Role and Value of Traditional Knowledge

The significance of traditional wisdom is increasingly being recognised more and more. The modern industrial and agricultural sectors as well as those who rely on this knowledge in their daily lives value it. Traditional knowledge serves as the foundation for a number of commonly used goods, including cosmetics, health care items, and plant-based medications. Agriculture, non-wooden forest products, handicrafts, and other important items based on traditional knowledge are also available.

Sustainable development can benefit greatly from traditional wisdom. The vast bulk of the world's genetic resources are found in regions where the majority of indigenous peoples and local communities are located. Many of them have been cultivating and making sustainable use of biological diversity for a very long time. Some of their methods have been shown to improve and promote local biodiversity and support the maintenance of wholesome ecosystems. However, indigenous peoples and local communities play a much larger role in biological diversity conservation and sustainable usage than they do in managing natural resources. Their knowledge and methods serve as a significant resource for the whole community and a good guide for biodiversity policies. Additionally, indigenous peoples and local communities are most closely involved in conservation and sustainable use since they are on-site groups with significant knowledge of their surroundings. (Diversity, 2021)

3.5 Importance

The importance of traditional knowledge is being recognised more and more. Traditional knowledge is beneficial to contemporary business and agriculture as well as to individuals whose daily lives depend on it. The everyday routines and customs of indigenous peoples, as well as their in-depth knowledge of their ecosystems developed over many generations, serve as the foundation for traditional knowledge concerning land and species conservation, management, and restoration.

It has the potential to be extremely important for sustainable development and for tackling the most urgent issues facing the world today, such as climate change, land management, and land conservation, as well as for advancing scientific, technological, and medical research, as demonstrated, among other things, by the production of pharmaceuticals. Additionally, traditional knowledge may present viable ways to ensure food security for everyone, not only indigenous peoples. Indigenous land management techniques have a long history of being used to protect the environment, manage natural resources, and encourage biodiversity in local communities.

A important approach to conserve and preserve indigenous cultures and identities, lower illiteracy and school dropout rates, improve learning, save the environment, and promote welfare is through educational practises that incorporate indigenous traditional knowledge and languages.

3.6 Challenges

Indigenous peoples have been the victims of continued colonialism, racism, exploitation, and dispossession throughout history, which has resulted in structural injustices, societal marginalisation, and vulnerability. These procedures have also devalued and damaged traditional knowledge.

Indigenous languages, which contain vast amounts of traditional knowledge about conservation and ecological systems and provide options for protecting biodiversity and cultural variety, are also in danger. The United Nations General Assembly's initiative to safeguard indigenous languages and consequently safeguard traditional knowledge is to declare 2019 the International Year of Indigenous Languages. (UN, 2019)

3.7 Organic Agriculture

Organic farming system is a method of farming system which primarily aimed at sustainable agricultural production in an eco-friendly pollution free environment and being followed from ancient time in India. Organic Production system, keep the environment and ecology alive and in good health by use of natural resources to harness desired agricultural production for human consumption. In Organic production, environment focus is on using naturally available resources as inputs, such as organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers/ bio control agents) to release nutrients to crops and protect them from insect pest and diseases for increased agricultural production.

3.8 Principles of Organic Agriculture

- Principle of Health: Organic farming should uphold and improve the health of the land, plants, animals, people, and planet as a whole and indivisible. As a result, it should refrain from using any fertilisers, pesticides, animal medications, or food additives that could be harmful to one's health.

- Principle of ecology: Based on living ecological systems and cycles, organic agriculture should cooperate with them, imitate them, and support them. The common ecosystem, which includes landscapes, climate, habitats, biodiversity, air, and water, should be protected and benefited by those who produce, process, trade, or consume organic products.
- Principle of care: Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment. Decisions should reflect the values and needs of all who might be affected, through transparent and participatory processes.
- Principle of fairness: Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities. Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs. (WELFARE, 2022)

3.9 Modern Agricultural Practices in Goa

Greenhouse farming: In recent years, farmers in Goa have started using greenhouses to grow crops such as tomatoes, cucumbers, and bell peppers. This helps to control the environment and protect crops from pests and diseases.

Use of modern machinery: Tractors, power tillers, and other modern machinery are used in Goa to plow fields and perform other farming tasks more efficiently.

Irrigation systems: Modern irrigation systems such as drip irrigation and sprinkler irrigation are being used in Goa to conserve water and improve crop yields.

Improved crop varieties: Farmers in Goa are now using improved crop varieties developed through hybridization and genetic modification to increase yields and improve crop quality.

Overall, traditional and modern agricultural practices coexist in Goa, with farmers blending the old and new to create a sustainable and productive farming system.

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Data Analysis

Goa, a state located in the western region of India, has a rich agricultural heritage that blends traditional and modern practices. Let's take a closer look at both:

4.1 Traditional Agricultural Practices in Goa:

Terraced farming: This is a traditional agricultural practice commonly used in the hilly regions of Goa. It involves cutting terraces or steps into the steep slopes to create a flat surface for cultivating crops. This helps to conserve water and prevent soil erosion.

Use of organic fertilizers: Farmers in Goa traditionally use organic fertilizers such as cow dung, poultry waste, and compost to enrich the soil and promote plant growth.

Mixed cropping: Farmers in Goa practice mixed cropping, where different types of crops are grown together in the same field. This helps to increase biodiversity and reduces the risk of crop failure due to pests or disease.

Rain-fed agriculture: Most farmers in Goa depend on rainwater for irrigation, and they time their crop planting to coincide with the monsoon season.

4.2 Important Crops of Goa

Fruits include Jackfruit, Mango, cashew, coconut, banana, pineapple, and arecanut, among others.

Vegetables Chillies, Brinjal, Bhendi, Cucumber, Pumpkin, Gourds, Musk Melon, Red amaranthus, Raddish, Cabbage, Long beans, Khol-Khol, cluster beans, Bottle Gourds etc.

Field crops include groundnuts, cowpeas, sugarcane, rice, and ragi.

Spices: Black Pepper, Nutmeg, Kokum, Turmeric, Cinnamon, etc

Tubers include colocasia, yam, elephant foot, dioscorea, sweet potato, and others.

Vegetables Chillies, Brinjal, Bhendi, Cucumber, Pumkin, Gourds, Musk Melon, Red amaranthus, Raddish, Cabbage, Long beans, Khol-Khol, cluster beans, Ivy gourd (Tindly),

Bottle Gourds, Ridge gourd (ghosale), etc

Sr.no	Season of cultivation	Major vegetable crops
1	Kharif or rainy season (June-September)	Cucumbers(tovshe), Ridge gourd (ghosale), snake gourd (padvole) , bitter gourd (karli), pumpkin (dudi), Ivy gourd (Tindly), okra (bhende), chilli etc.
2	Rabi or winter season (October-February)	Sweet potato, Brinjal, Amaranthus (tambdi bhaji), vegetable cowpea(vali), Radish(mulee),knol knol(knab), okra (bhende), pumpkin, chillies, onion, cluster beans(chitki) , sweet corn eat.
3	Rabi extended summer. (February-May)	onion, Amaranthus (tambdi bhaji), okra (bhende), chilli, vegetable cowpea (vali).

4.3 Various Stages of Cultivation Preparation of Fields

- Ploughing: Ploughing starts as first shower of monsoon begin in June. Earlier ploughing as done manually with help cattle and plough for proper bonding and levelling of soil by breaking up the land into lump of soils and turning he soil so that everything on the upper surfaces gets buried.

- Sowing: Sowing plays crucial role in farming, traditionally they were using the perry harvest of previous year which was preserved for the purpose of sowing.

  Then these seeds were used for sporting farmers used to fill the seeds in bamboo baskets and water it three four times a day covering by cloth or sacks and keep for continuous five days and then these sprouting seeds were thrown in ploughed field and kept it for further growth.
- Transplantation: After four weeks the seedlings are uprooted hen these were relocated in other section of the field for further process of healthy crop in area which is more fertile which helps thee roots to penetrate deeply into the soil .farmers used to ensure seedling have equally spaced and have required space.
- Weeding: In august as the crops grows so do the weeds, the farmer use to remove the weeds manually. Farmers use to avoid destroying young seedling by being very careful and avoid stepping on that young seedling. Cattles used to grass on hilly areas and during rainfall their cow dung used to flow down in fields as manure. These minor details plays crucial role in agriculture.
- Harvesting: In October there is complete change in the appearance of the fields he greenery is seen turned golden brown marking he harvesting season. Farmers use to start cutting the crops by sickle and filtering by crushing it with the feet.
- Threshing: removal of grains from plants was done manually by hand beating it against the object so grains shatter easily.
- Winnowing: the grains then to be filtered from dust by throwing it from the height. The heavy grains used to fall near and the empty husks fall far. The grains that were of heavy and best quality were stored for sowing purpose. (Storage structures: Mudi is prepared with dried paddy straw and threads of local plants. Basically, the mudi is round in shape and the top part is open. The open top will be closed after filling the grains. Paddy straw protects the grain from moisture so post harvest losses will be avoided.)

  The second quality was for consumption (ukade and surai tandool)

  The third quality which was broken rice kernel was used for rice flour. Next quality was used for cattle and lastly they use to burn the unwanted and use that ash in fields for better soil. After the process of filtering the grains, grains

were kept for drying under sun for a period of 15 days when the grains dried in middle of November he final stage was to remove rice from the hard protective covering called rice husks.

Source: Tejaswini Velkar (during field visit on 14/April /2023)

Cattle

Farmers worship cattle, worshipping cow is equal to worshipping god and use to treat them as family members .indigenous cows and bullocks are small in size compare hybrid cattle. Local cows are capable of giving 2 -3 litre of milk where as productive cow gives 30 litre milk every day. In olden days they used o remove milk with hands now they engage machines farmers use to use bullocks and buffalo to plough or pull cart and to take transport and also for process like water irrigation and threshing . Cow dung and cow urine is still seen as purifiers, anti fungal antiseptic antibiotic and anti-oxidants. Cow dung is used for fuel, fire and also plaster to floors of mud houses. Cows are useful as their milk provide nourishment. Cattle use to graze on hilly areas and their dung and urine use to flow in fields which acts as manure and natural growth promoter to the plants and it provides nutrition to soil and improves soil fertility. Goats, pigs are also used. Goa dung is also used as manure. Now all jersey cows are

seen in cowshed. Nowadays cattle are seen on roads. Farmers are selling their cattle as it becoming difficult to handle cattle.

Now all work is done by machine. Machines have replaced cattle. Cow dung is used in very less amount. Everybody has concrete house mud houses are not common now. Due to urbanization and industrialization, there has been a decline in the number of cattle and a shift towards more productive and efficient breeds of cows. This has resulted in the marginalization of indigenous breeds of cattle and a loss of traditional knowledge related to their rearing and use.

The worship of cows in India is a cultural and religious practice deeply ingrained in the social fabric of the country. It is believed that cows are sacred and symbolize wealth, strength, and motherly love. However, this cultural practice has also been politicized and used as a tool for social and political control.

While cattle have traditionally been an integral part of Indian agriculture and rural economy, the mechanization of agriculture and the shift towards industrialized dairy production has led to a decline in the importance of cattle in the economy. This has resulted in farmers selling their cattle or abandoning them, leading to the problem of stray cattle on roads and in urban areas.

The use of cow dung and urine as manure and natural remedies is still prevalent in many parts of India, especially in rural areas. However, the industrialization of agriculture and the increased use of chemical fertilizers and pesticides have led to a decline in the use of traditional organic methods of farming.

In conclusion, cattle have played an important role in Indian agriculture and culture for centuries, but their significance has diminished in recent years due to various factors. However, the use of traditional knowledge related to cattle rearing and the use of their products still holds potential for sustainable and organic farming practices.

Source: Tejaswini Velkar (during field visit on 05/April /2023)

Source: Tejaswini Velkar (during field visit on 05/April /2023)

4.4 Traditional water harvesting system in Goa.

The traditional water harvesting system in Goa is known as the 'laat' or 'latt' system, which is used to lift water out of ponds called 'honed'. This system is primarily used by farmers in rural areas to water their crops, especially seasonal crops such as vegetables, chillies, and onions.

The 'laat' system is a traditional water lifting irrigation method that involves pulling a filled 'kolame' or bucket using a pole with lateral flexibility. This system allows the

man to lift the weight of water without exerting too much energy, and it has a long reach, which can be done without ducking, even when the water level drops too low.

In addition to the 'laat' system, people in Goa also have wells in 'kulaghar', which is another traditional water harvesting system. These wells are used to collect rainwater and groundwater, and they play an important role in maintaining the water supply in rural areas.

Overall, traditional water harvesting systems like the 'laat' and 'kulaghar' play a crucial role in sustaining agriculture and ensuring water availability in rural areas. These systems are not only efficient but also eco-friendly and sustainable, making them an excellent alternative to modern water harvesting systems.

source: The Times of India dated Feb 17, 2019

Source: Tejaswini Velkar (during field visit on 14/April /2023)

4.5 Kulaghaar

It is a plantation area. There is plantation like Arecanut, Coconut, Banana, Jackfruits, Kokum and Mango trees. Well is also at same area, small house is build for storage and o keep equipments.

Source: Tejaswini Velkar (during field visit on 05/April /2023)

4.6 Puran sheti

Puran Sheti is a term in Marathi language, which translates to "organic farming" in English. It refers to a type of farming that emphasizes the use of organic inputs such as cow dung, compost, and other natural fertilizers, and avoids the use of synthetic pesticides and fertilizers. The concept of Puran Sheti is based on the principles of sustainability, biodiversity, and conservation of natural resources.

In Puran Sheti, farmers use traditional methods of farming that have been used for centuries in India. These methods include mixed cropping, crop rotation, and the use of natural pest control methods such as companion planting and the use of beneficial insects. The aim of Puran Sheti is to create a self-sustaining ecosystem in which the soil is rich in organic matter, the crops are healthy and pest-resistant, and the environment is protected from harmful chemicals.

Puran Sheti has gained popularity in recent years due to concerns about the negative impact of conventional farming practices on the environment and human health. By avoiding the use of synthetic chemicals, Puran Sheti promotes a healthier environment for farmers and consumers, and helps to preserve the natural biodiversity of the area. It also helps to support rural livelihoods by creating sustainable and diversified farming systems. Landless farmers in Sattari, Dharbandora, and Bicholim used to rely heavily on puran sheti, or agriculture based on silt, as a means of subsistence. There was no ploughing involved; only organic manure was used. However, many farmers stopped using this method permanently because of the development and construction in Goa.

4.7 List of Farmers Interviewed

Sr. No	**Name**	**Age**	**Place**	**Qualification**
1.	Tulsidas Vernekar	46	Curca	8^{th}
2.	Kavita Kavlekar	55	Raibandar	6^{th}
3.	Narayan Naik	66	Pednem	Post graduate

4.	Deepak Gaonkar	58	Ponda	B.E
5.	Indrakant Naik	56	Curca	10^{th}
6.	Pradeep Vernekar	47	Curca	12^{th}
7.	Milagres Fernandes	66	Ponda	12^{th}
8.	Priyanka Vernekar	42	Curca	12^{th}
9.	Rupa Vernekar	37	Curca	SSC
10.	Usha Naik	50	Curca	6^{th}

Education

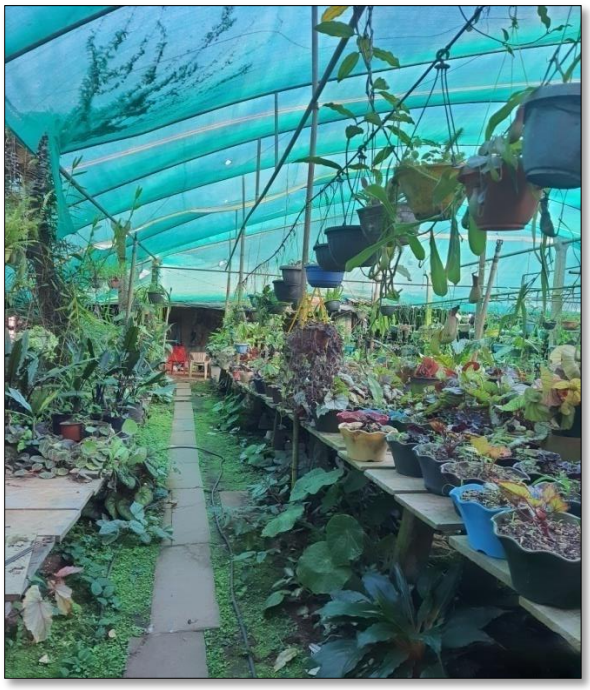
The amount of the farmers' land holdings is anticipated to have an impact on their education level because education depends on a person's socioeconomic background. According to observations, the biggest percentage of the marginal

Farmers had lower levels of education, but no medium- or large-scale farmers fell into this category. The majority of marginal and small farmers had education levels below secondary, compared to the majority of the medium-sized farmers and the larger farmers have degrees or higher. Thus, it is evident from the examination of farmers' landholding sizes and educational levels that there is a direct correlation between these two factors.

1. What is the type of ownership of land?

   The majority of farmers own their own land. An individual inherits agricultural land from his father, which is shared by all of them. Few people are farming on Landlord (Batkar) property because it wasn't their own. Some large farms have purchased it for commercial use. They have made it available for tourism and other event management programmes as well as expanded it to include nurseries and spice farms that cultivate a variety of plants, including flowers, indoor plants, and more.

Source: Tejaswini Velkar (during field visit on 02/April /2023)



Source: Tejaswini Velkar (during field visit on 02/April /2023)

2. For how long are you working in the field?

Some farmers are engaged in farming full-time. Some people work part-time on weekdays and after work. People who work full-time only have one source of income and may devote their entire attention to farming. Family members who are employed in the field support farmers who work part-time in the field.

3. Do you grow vegetable in your field?

Farmers have their own farms where they cultivate a variety of vegetables, including ragi, which is grown in very small quantities. Farmers also have their own cashew and coconut farms. All farms grow produce like cowpeas, tovshi, alsano, chilies, papaya, bananas, sweetpotato, vaal, pumpkin, ladyfingers, drumstick, red amanthanus, brinjals, and radish gadde. In Batkar's land, just a few farmers had been engaged for a long time. Nutmeg, a type of spice, is grown by major farmers who also export their products. Since Thailand has a similar climate to Goa, decorative plants are also brought from Thailand.

Source: Tejaswini Velkar (during field visit on 11/April /2023)

Source: Tejaswini Velkar (during field visit on 11/April /2023)

4. How many times do you visit the field or number of daily working hours?

The average number of visits by farmers is two to three times a year, or whenever they have free time. Morning and evening visits are made by nearby small farmers. Large farmers operate their own farms and employ workers who spend the entire day there.

Source: Tejaswini Velkar (during field visit on 14/April /2023)

Source: Tejaswini Velkar (during field visit on 14/April /2023)

5. How do you manage to get seedlings for future vegetable growth?
   Farmers purchase it from the market, and the government also provides seeds for growing it. Some people keep seeds from past years.

6. What difficulties or challenges do you face in doing this work?

Financial problems. Government provide subsidy but first we should have that much of money to build well or buy water pump, so that comes little difficult. Health problems.

Wild animals destroys farms and grown vegetables.

7. What problems did you face in pandemic?

   Small farmers expressed difficulties in purchasing supplies like seeds, fertiliser, and insecticides due to the pandemic. Also there was less market sales of their crop products. They were unable to find the necessary number of employees to work in their fields. Large farmers weren't significantly impacted Given that their labours stayed with them.

8. Do you hire labours for your help in field?

   Yes, but small farmers find labour to be quite expensive. As a result, they rely on family members, neighbours, and other people to help them out and support them with the tasks that they can complete. Large farmers require labourers and machinery.

9. Is there any scheme given by government? Do you avail them?

   Yes, the government issues Krishi cards to all farmers, enabling them to purchase farming equipment, fertiliser, and seeds.

10. Which are the agriculture product are there in your farm?

    Small farmers were having less land so they cultivate in small areas they are growing more vegetable and paddy and cashew cultivation and coconut cultivation is not much. Large farmers are engaged in spice coconut cashew.

11. Varieties of rice grown?

    Goan farmers had evolved a series of rice varieties like Damgo, Babri, Dodig, Kochri, Patni and Corgut, suited to Goa's soils, climate and rainfall and also provide better nutrition and taste. As there is no much encouragement for the traditional rice varieties, they are on the decline. Farmers now grow only Jaya and Jyoti. ‘Ukdya tandalchi pez’ the starchy, thick gruel prepared from red variety of local rice is still a favourite of local people.

12. Manure that has been used in your field.

Cow dung, goat dung is used as manure is farms. Chemical fertilisers destroy the soil-enriching microorganisms. Synthetic fertilisers are harming our farmers' soil and plants by contaminating them with unidentified diseases, but they still use them. Goan farmers used organic manure in the past. Manure was produced using dung and leaves. However, due to deforestation today, the leaf mulch potential has drastically decreased.

13. Equipments that are used for farming?

Pickaxe /Kudaali /Kudal, Paraay, Khoyti, Khoyto,Nangar, are traditionally use Equipments now we also use tractors and other machines.

Source: Tejaswini Velkar (during field visit on 14/April /2023)

14. What do you prefer modern farming or traditional farming?

Farmers claimed that ancient farming was quite practical and that not all of the fertilisers used today are causing health problems. Contamination of the soil from fuel or oil leaks from tractors. In order to increase productivity, the Directorate of Agriculture encourages farmers to utilise chemical fertilisers, herbicides, and insecticides. However, fertilisers are actually damaging to both human health and agricultural soil.

15. Why traditional farming is declining in Goa?

    Due to high manpower costs for numerous agricultural processes, conventional techniques of farming paddy have become extremely unprofitable. Nobody wants to work in agriculture. No one wants to work in the fields; everyone wants office jobs. The collapse of agriculture is also attributed to unpredictable monsoons, rising mining and development activities, a lack of irrigation, and the trend towards white-collar jobs.

16. What you think government should do?

    Government should provide good quality seeds, fertilizer, pest controls, and even machinery and there is a need to pay proper attention to the farms, which may be of vegetables or rice cultivation. Farmers also wanted financial help. They should try to give some amount of money that vendors and farmers had to suffer due to different problems like change in weather, lockdown or pandemic, cyclones, etc. Farmers and workers in agriculture and allied sector be recognised and registered farmers and be given social security benefits such as health care and old-age pensions, etc.

Source: Tejaswini Velkar (during field visit on 05/April /2023)

4.8 Interview conducted with officers of Agriculture Department

DIRECORATE OF AGRICULTURE

Sr.No	Name	Designation	Qualification	No. of years of service
1.	Sujay Shirodkar	Agricultural Officers	M Sc in Agriculture	30 Years
2.	Avdhut Sawant	Agricultural Officers	B Sc in Agriculture	27 Years
3.	Mahesh Bokade	Agricultural Officers	B Tech in Agriculture	10 Years

1. What is the concept of traditional farming in Goa?

   Traditional occupations of Goa refers to the work and jobs which the people of Goa undertook in the earlier times, which might now be coming under pressure for a variety of reasons. Earlier farming was an important job carried by the majority of Goan people for their day to day livings. They had to spend most of their time working in their own fields. At the end of the day or in the late evening they return home very tired and then the next day continues with the same. people use to help each other in work.

2. What are the traditional occupations of Goan farmers?

   Some fields listed as traditional occupation are agriculture, sand extraction, coconut plantations, betel nut plantations, cashew plantations, brewing feni, cashew nut processing, among others.

3. What are the crops cultivated in traditional farming in Goa?

   Plantations like Cashew, Groundnut, Areca nut, Coconut, Banana ,Jackfruits, Kokum and Mango trees. Farming is one of the most important occupations in Goa. The Goans can't live without the fish, curry, rice as it is the staple food of Goans. Ragi was grown in hilly areas during rainy season but in less range. In some places the paddy is grown twice in a year and in some places only for once depending upon the climate and irrigation facilities. The paddy which is grown from May to August is called Sarad . And the paddy grown from September to February is called Vaigon. The farmers use to ready their fields before rainy season and the farmers use to plough their fields by making either use of buffaloes or tractors. The farmers also make use of fertilizers and manures. The transplanting of paddy is done after 40 days. They also have to maintain their fields by removing weeds and during the harvest time, the farmers have to dry the water from the field. In olden times, the harvesting was done by using primitive tools but now the harvesting is done by machines. After the harvest, the paddy is put for drying and after farmers sell their paddy in Government Agriculture Department because the farmers get subsidy on it that is why the farmers sell their paddy. Azgo, Corgut is old variety but production was less. Kazan land has been filled with saline water because it was not maintained properly by farmers. After paddy they cultivate Alsano crops in November December.

4. Which are the areas where traditional farming is/was prime occupation in Goa?

   Salcette, Canacona, Sattari.

5. Varieties of rice cultivated in goa?

   Old varieties include Damgo, Babri, Dodig, Kochri, Patni, Azgo and Corgut. New types of Jaya, Jyoti, Karjat are presently in demand. Due to their high productivity and increased market demand, department primarily supports high yielding and hybrid types of rice.

6. Varieties of millets cultivated in goa?

   Nachani finger millet.and Vari Proso millet

7. Varieties of vegetables cultivated in Goa.

   Cucumbers(tovshe), Ridge gourd (ghosale), snake gourd (padvole) , bitter gourd (karli), pumpkin (dudi), Ivy gourd (Tindly), okra (bhende), chillies, Sweet potato, Brinjal, Amaranthus (tambdi bhaji), vegetable cowpea(vali), vegetable cowpea(vali), Radish(mulee),knol knol(knab), okra (bhende), pumpkin, chillies, onion, cluster beans(chitki) , sweet corn.

8. Why traditional farming is declining?

   Very few farmers now prefer to carry out various agricultural activities manually and with the help of bulls and buffaloes, as they think it is time consuming and uneconomical". Production is less. Labours are expensive. Nobody wants to work in field. Now very less people are depending on farming here are other sources of income. People want easy money. People don't have time and patience. Interest in agriculture is less among people. Mechacanized tools are replacing labours, animals and old equipments.

9. Why people are not engaging in Traditional farming?

   Very few farmers now prefer to carry out various agricultural activities manually and with the help of bulls and buffaloes, as they think it is time consuming and uneconomical. Labours are expensive. Nobody wants o work in field. Now very less people are depending on farming here are other sources of income.

10. How departments are helping farmers?

    Traditional agriculture, which once supported Goa's economy and gave many people a means of subsistence, is currently in steep decline. This condition is the result of various circumstances. First of all, Goa's farming community think that modern agricultural techniques have rendered traditional paddy-growing techniques exceedingly unproductive. By providing subsidies for agricultural mechanisation, the Directorate of Agriculture has somewhat alleviated the problem of high labour costs. Mechanisation of agriculture is projected to fill the gap created by a labour shortage on farms in addition to lessening the strain for local farmers.. Previously, the department provided subsidies for the purchase of other agricultural gear in addition to subsidies for paddy transplanters. All these

initiatives and incentives have promoted the mechanisation of agriculture. We offer plantation, support prices for agricultural activities. We have fixed rate for the cultivation of vegetables. If a farmer is in need, we assist him through Aadhar Nidhi. We offer subsidies on everything. In order for the agricultural community to accept modern scientific farm technology, the Farmer Training Centre offers a variety of training programmes and takes them on exposure trips both inside and beyond. The state trains officials from agricultural and other lining departments as well as extension workers. It occasionally also holds other workshops and seminars.

11. What can farmers do to retain the traditional techniques?
    Use of natural resources to improve soil health. Example ploughing instead of machine. By continuously incorporating crop and weed biomass, using animal dung, urine-based manures like vermicompost, biofertilizers and bioenhancers, and using special liquid formulations like vermiwash, compost tea, etc. throughout the duration of a crop, living soil can be maintained to improve soil health, the ecosystem of the area, and the quality of produce. Cattle waste, domestic food waste as manure. and crop remnants should be brought back to the plot, either directly or indirectly.

12. Subsidy and schemes for farmers?
    We provide farmers well subsidies up to 75%; the only requirement is that they hold a Krishi card. Farmers must have an electric connection before receiving up to a 90% subsidy off the usual cost of the water pump set, which come in 1 hp, 2 hp, and 5 hp ranges. And for the remaining 5 hp and higher, we offer a 50% subsidy. We offer 50% subsidy even for the repair of ancient pumps. We also offer solar energy subsidies. 90% of typical cost for drip irrigation and 75% of standard cost for sprinkler irrigation. Additionally, there are subsidies for micro irrigation and water storage tanks said Agriculturalist Sujay Shirodkar.

Interview conducted with officers of Agriculture Department

Source: Tejaswini Velkar (during field visit on 19/April/2023)

5.1 Major Findings

- Around 80% of respondents reported being extremely satisfied with their jobs, and only 20% of respondents reported being dissatisfied with what they do.
- It was also observed that some of them feel that their livelihood is still dependent on their traditional methods of farming and rest were having jobs and businesses.
- However finding also shows that most of the locals are using old traditional methods. Through the use of contemporary tools, they have altered their working methods. This demonstrates how it influences our conventional approach. There aren't many farmers who have been commercialised for financial gain.
- Small farmers in rural areas were not much aware about workshops and Training provided by government.
- Though government is providing support in modern equipments, seeds, fertilizers, irrigation methods and subsidies they are lagging behind preserving old or traditional methods which too had benefits.
- Modern Equipments, Machines Pesticides, Fertilizers are affecting not only human health but also soil, water quality, and creates Air pollutions.
- Majority of farmers said they will continue farming but they are not sure if their future generation will continue doing this work.
- Natural reason affecting farming like Wild Animals, and insects, different fungal infections damages crops and other plantations.
- Natural reason Climate change like excessive rain or excessive heat also damages field crops.

6.1 Suggestions / Recommendations

To develop a model for creating a database on indigenous knowledge on agricultural systems of Goa, we can follow these steps:

Define the scope: The first step is to define the scope of the database. This includes determining the specific areas of indigenous knowledge related to agricultural systems that the database will cover. For example, this could include traditional farming practices, crop varieties, pest and disease management techniques, soil management practices, and so on.

Identify sources of information: Once the scope is defined, the next step is to identify potential sources of information. This could include local farmers, agricultural experts, academics, government reports, and other relevant literature.

Collect and organize data: Data can be collected using various methods, such as interviews, surveys, and observations. Once data is collected, it should be organized in a systematic manner. This can be done using a spreadsheet, a database management system, or other relevant tools.

Develop a taxonomy: To ensure that the data is easily searchable and accessible, a taxonomy should be developed. This involves categorizing the data into specific fields, such as crop type, cultivation practices, and so on.

Establish data standards: To ensure that the data is accurate and consistent, data standards should be established. This includes defining data fields, data formats, and other relevant guidelines.

Validate and update data: The database should be regularly validated and updated to ensure that the information is accurate and up-to-date. This could be done through periodic surveys or by consulting with local experts.

Provide access: Finally, the database should be made accessible to relevant stakeholders. This could include local farmers, researchers, policymakers, and others who could benefit from the information. The database could be made available through a website, a mobile app, or other relevant platforms.

Overall, developing a database on indigenous knowledge on agricultural systems of Goa requires a systematic approach that involves defining the scope, identifying sources of information, collecting and organizing data, developing a taxonomy, establishing data standards, validating and updating data, and providing access to relevant stakeholders.

Due to paucity of time it was not possible to collect all he required data across goa which is required for creating the recommended database hence in conclusion there is scope for taking this topic as the project to collect the entire the data and develop the database which will be a great asset to the state of Goa.

7.1Conclusion

In the state of Goa, modern practices and indigenous knowledge have both played important roles in agriculture and farming systems. While modern techniques have led to increased yields and efficiency, indigenous knowledge has helped to preserve traditional practices and maintain environmental sustainability.

It is clear that both modern practices and indigenous knowledge are valuable assets in the agricultural sector. However, it is important to strike a balance between these approaches to ensure that farming systems are sustainable and promote environmental health.

In order to achieve this balance, it is necessary to recognize and incorporate the knowledge and practices of local communities. This includes respecting traditional farming practices and promoting the use of indigenous crops and seeds. At the same time, it is important to invest in modern technologies and innovations that can help to increase yields and improve efficiency.

Ultimately, a holistic approach to agriculture and farming in Goa will require collaboration between farmers, policymakers, and researchers. By working together and combining the strengths of modern and traditional approaches, it is possible to create a sustainable and thriving agricultural sector in the state of Goa.

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QUESTIONNAIRE

Questionnaire for farmers

1. Name
2. Age
3. Educational qualification
4. Occupation
5. What is the type of ownership of land?
6. For how long are you working in this field?
7. Do you grow vegetables in your field or work as a time-based worker in other fields?
8. How many times do you visit the field and the number of working hours daily?
9. How do you manage to get seedlings for future vegetable growth?
10. What difficulties or challenges do you face in doing this work?
11. What problems did you face due to this pandemic?
12. Do you hire labourers for help in your field?
13. Is there any scheme/ benefits given by the government for farmers? If yes do you avail them?
14. Varieties of rice grown?
15. Which are the agriculture product are there in your farm?
16. Manure that has been used in your field.
17. Equipments that are used for farming?
18. What do you prefer modern farming or traditional farming?
19. Why traditional farming is declining in Goa?
20. What you think government should do?

Questionnaire for Agricultural Officers

1. Name
2. Number of years services
3. Qualification
4. Designation
5. What is the concept of traditional farming in Goa ?
6. What were the crops cultivated in traditional farming in Goa
7. Which were the areas where traditional farming was prime occupation in goa
8. Name the varieties of rice cultivated in Goa
9. Name the varieties of millet cultivated in Goa
10. Name the vegetable varieties cultivated in Goa in traditional farming methods
11. Why traditional farming is declining?
12. Why people are not engaging in Traditional farming?
13. How departments are helping farmers?
14. What can farmers do to retain the traditional techniques?
15. Subsidy and schemes for farmers?