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Socio- Economic Models of Small and Marginal Farmers in Kerala

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Abstract: Agriculture continues to be the backbone of the Indian economy, accounting for 20 percent of the country's GDP and employing 42 percent of the workforce. It is the primary source of income for 86.6 percent of India's small and marginal farmers. Farmers require a climate-resilient agriculture system, credit input system, compact technology for small lands, proper marketing linkage, capacity building program, a training program on value-added products, financial inclusion program, village storage facilities, timely crop insurance, agriculture extension services, and the benefits of information and communication technology (ICTs) in the changing scenario. To face the problem of sustainable development in the villages, the study proposes an integrated approach of supporting agricultural and allied activities in rural areas that are rooted in local conditions, resources, and institutions. The paper examines through a few success stories how small and marginal farmers converted challenges into opportunities and strengthen the village economy. Long-term microfinance with well-equipped resources can assist in driving economic growth from the ground up. In a developing country like India, microfinance is considered as a tool for poverty reduction and local economy as well as a tool for socioeconomic development. It has the capacity to give low-income people loans without jeopardising their financial security. Microfinance is one of the development solutions that can help achieve SDGs 1 and 2 (No Poverty and Zero Hunger), respectively.

Keywords: Small and Marginal Farmers, Socio-economic Model, Dairy Farming, Women Farming, SHG's and JLG's Models, Income Generation, Goat Farming

1. Introduction

The majority of the farmers engage in only one activity (crop cultivation), and their income is entirely dependent on crop value. Furthermore, an unbalanced market, as well as poor agricultural demand and supply management, have a detrimental impact on crop income. Mixed farming, which combines livestock and crops with a focus on fodder crops, should be given more attention. Climate resilience technologies are being used in all crops to combat climate change. In agrarian villages, improving farmers' potential for sustainable agriculture with higher returns is crucial for food security. A mixed farming system is one way to deal with such problems because it gives farm owners with improved income and production returns. Monoculture farming could be the only way to grow crops alongside cattle. Mixed Farming is an agricultural system in which farmers combine multiple agricultural methods, such as cash crops and livestock. Mixed farming includes crop-livestock, crop-forestry, crop-horticulture, fish-pig, fish-duck, and paddy-fish. Farmers can cut their production costs per unit area, enhance their income and productivity, and reduce their risk by using a mixed farming system.) [4]. Microfinance, or the providing of modest loans to the poor with the goal of pulling people out of poverty, is a fundamental poverty-reduction approach that has spread swiftly and widely over the last 20 years, (Bateman, 2010 [2, 3]. If the price of organic rice is higher and gets the proper support of civil society in return society gets the health and environment benefits. Sharing of information and technical knowledge is required for this. The case study revealed that the convergence method is one of the best methods we can adopt for the future for the sustainable growth of agriculture and bring income stability to marginalized communities. [1]

2. Objectives

1) To study about the Socio-economic status of small and marginal farmers.
2) To study about the cost of cultivation, returns and probability of different models.
3) To study about various activities done by small and marginal farmers as part of livelihood and income.
4) To study about the employment generated, input cost, labours and wages for cultivation.
5) To overcome climatic changes, use of climate resilient technologies in all the crops.

In agriculture Census, Farmers are classified on the basis of operational holdings [5].

Table 1. *Classified on the basis of operational holdings.*

Category	Land Size (Hectare)
Marginal	Below 1.00
Small	1.00-2.00
Semi- Medium	2.00-4.00
Medium	4.00-10.00
Large	Above 10

3. Background

Examined success stories of small and marginal farmers who is doing different activities of farming at Thrissur and Palakkad District.

4. Methodology

4.1. Selection of the Study Area

The study will be conducted in region of Palakkad and Thrissur district for the year 2019-20 and 2020-21, for the comparison between before and after COVID-19.

4.2. Sampling Design

Three-stage-stratified-random sampling technique will be adopted for the study. The studies were conducts in different FPO's and among individual farmers in Palakkad and Thrissur.

4.3. Selection of Villages

A list of all the villages are Meloor, Nemmara, Kollaemcode, Attapadi will be taken from the respective FPO's.

4.4. Selection of Farmers

A list of the farmers having less than or equal to one hectare of operational holding in the selected villages, were prepared with the help of JLG and SHG members of FPO's. All the farmers are small and marginal farmers. Thus, in 15 farmers success stories will be covered for the purpose of the present study.

4.5. Collection of Data

A well-structured schedule were prepared to obtain the relevant information regarding the family size and its composition, land size, the total cultivation cost, cropping pattern, input use, variable and fixed costs, bank loan and income from land, and product marketing were also be collected from the selected sample households.

5. Success Stories of Farmers

5.1. Natural Farming-An Alternative System Supported by Microbial

Shri Lonai M V began planting natural paddy at Chali Padam, Meloor Panchayath, five years ago. Natural farming is a sort of alternative agriculture that largely relies on microbial assistance. The amount of tillage used is maintained to a bare minimum. Because of the low-level flooded water entering the field from the river, natural microorganisms are found at Chali Padam. For Rs 2000, he leased 2.05 acres of land and planted Ponmani rice on it. Ponmani paddy seeds are used for cultivation because they are pest and disease resistant and produce a high yield. [1]

Ponmani has a growing span of 120 days and a yield of 1500 kg per acre. SupplyCo pays 28.50 per kilogramme for the rice. He was also given a cash incentive of Rs 22000 per hectare, and he sells the straw for Rs 15000 per acre. The whole cost of the project was Rs 10,000, which included everything from tillage through harvesting. He earned bonuses of Rs 7500 per acre, as well as adequate food for his family. He is setting an example for those who believe that paddy cultivation not profitable and that other crops are more profitable.

Figure 1. *Natural farming-An Alternative system supported by Microbial.*

5.2. A Successful Dairy Entrepreneur

M V Suresh, a Meloor panchayath native, began dairy farming in 1986 with two cows and today owns 32. Dairy farming in Manakkattupaddi is profitable, just like any other company. On his farm, he produces 120 litres of milk per day, which he sells to Milma Society in Adichili and local retailers. At Adichili, he grew C04 grass on two different farms (30 cents and 60 cents). He bought straws and dried ensiled pineapple scraps as feed. Because of its high fibre content, pineapple waste boosts milk production considerably. Milma also gives him K S cow feed, which he collects. [20]

The erection of cowsheds, he believes, is the most significant component in dairy production. He created the cow shed with his considerable experience in mind, taking into account sunlight, ventilation, fresh air, water availability, and space to move the cart to collect cow dung and trash, and spent Rs 4.5 lakh on the project. He divides milking and non-milking cows and keeps them on separate ranches. Pregnant cows (known as 'dry cows') will be removed from milking cows about two months before they are expected to give birth. When a cow is ready to give birth, she will seek out a clean, dry location that is free of other cows.

Cows were given a mix of cattle feed with pineapple waste, co4 grass, and nutrition after milking in the morning and afternoon. After the cattle have been fed, 1.5 kg of straw should be provided to ensure proper regurgitation. He spends over Rs 250 per day on each cow's feed. He received Jersey, Krishnagiri, Vechur, and Gir cows, among others. He also sells Ghee, Curd, and Dried Cow Dung in addition to milk.

A litre of petrol costs Rs 45 on average. As a result, his daily total income is Rs 5400, whereas his daily average expenditure is Rs 3000. As a result, he earns a monthly net profit of Rs. 72,000, which is a substantial profit. He supplemented his income with value-added items such as Vechur ghee, which he sold for Rs 3000 a kilogramme, and cow dung, which he sold for Rs 10,000 per month. [20]

Figure 2. *Successful Dairy Entrepreneur.*

5.3. Youth Proud to Be Part of a Farming Family

Nishad T N, a young member of a farming family, had always envisioned himself as a farmer. He began farming on his own 15 years ago on one acre of property and has since expanded to ten acres. He has.75 cents of his own land, while the rest of the land is leased at Rs10000 per acre. Along with raising cows, I'm now growing bananas, tapioca, and a variety of veggies. Now addition to banana and tapioca he is growing vegetables like Elephant yam, cowpea (Payer), beans and Bitter Gourd, Chinese Potato (Koorka), Ladyfinger, Spinach (cheera) and Chilli. He has 4 cows and produced 10 liters of milk every day and giving to Milma Society.

The rising cost of fertiliser, pesticides, and labour is the most pressing issue for small and marginal farmers in Kerala. My family pitches in to help with everything from cleaning to harvesting, so we can save money on labour. Due to a drop in demand, banana and tapioca prices have fallen sharply in the last three years, following the 2018 flood and then COVID in 2019. According to him, the price of Nendran banana has dropped to Rs 28 per kilogram and the price of tapioca has dropped to 4 Rs per kilogram this season, down from Rs 35 per kilogram and Rs 15 per kilogram the previous season. He added that ₹35 to ₹40 would be the remunerative per kg. Despite the difficulties, he continued to grow and cultivate vegetables and bananas, viewing them as possibilities and challenges for next season.

He also adds not having a proper marketing system and timely payment of prices are the main concern. Farmers en masse cultivating a banana and tapioca will also have reprisals with a drop in prices.

Figure 3. *Youth Proud to be part of a Farming Family.*

5.4. Women Embrace Integrated Farming: A Model Which Support His Family

Mrs Regi Jeels, a resident of the Meloor panchayath in Thrissur, Kerala, became a role model for women empowerment and accomplished the correct blend of agricultural and animal husbandry on her land. She didn't lose hope when her husband (a photographer by profession) underwent three major surgeries, despite the fact that he was the family's sole breadwinner. She epitomises the role of women in agriculture by establishing integrated farming on 17 cents of land. (which she now owns.) She now has ten cows, twenty-five goats, thirty rabbits, ten dogs, and sixty Desi (Nadan) hens. She now runs a profitable dairy business, supplying 70 litres of milk to neighbours, businesses, and Milma society from a herd of ten cows.

She earned around 50,000 Rs/month from milk. From goat rearing, she is able to sell 10 pairs of goats every year and earns 1,50000 Rs. Rabbit farming is not only profitable and enjoyable to her where pets have grown in small land without much investment. On average female rabbit produces 30 to 50 kits /year. She sells 30 rabbits/month and earns 7500 Rs from it. She got 10 Dogs, pairs of Labrador, Road Killer, Pomeranian, all costly dogs. Selling dogs to breeding dogs is not a piece of cake but with proper planning and investing time she earns 1,50000/year. Backyard poultry of Desi (Nadan) hen is one of the possible options for sustainable livelihoods and has been successfully implemented by her she is selling 30 eggs/day and earn 240 Rs. (8 Rs/egg).

It also plays a key role in supplementary income generation and family nutrition. She took 1.75 acres of land on lease by paying Rs 8000 and cultivated rice in one acre for their own use and in.75 acres cultivated Co4 hybrid grass for cows. They use organic manure and pesticide from their farm. Last year she got 1000 kg of rice which is sufficient for her family and got sufficient straw for the cow. It contains about 80 percent of substances that are potentially digestible and are therefore sources of energy for cows and helps to produce a good amount of milk. With agriculture and allied activities, she is able to educate her children and take care of her husband. Now she also engaged her husband in agriculture activities who now able to manage and reduce stress and with the hard-earned money she purchased 17 cents of land.

Figure 4. *Women embrace integrated farming: A model which support his family.*

5.5. Organic Is Way to Healthy Life

K K Kumaran resident of Meloor panchayath is doing mixed farming last 20 years. He was an BSNL Employee and after retirement, he is more actively into organic farming. He has 4 Cows 20 Nadan hens and 10 Ducks. Mainly he is doing vegetables like Ladyfinger, Cucumber, Tomato, Chilli, Brinjal, Bitter Gourd, Tapioca, Cowpea, spinach and Fresh Ivy Gourd (Kovakkai). 35 litres of milk is produced per day and sell the milk to the Milma Society. He is happier and take up organic farming to source farm-fresh vegetables for his family and never is family members went to the hospital for major treatment. Everybody needs to eat healthy food; they have to produce food at their own premises especially with cancer and other chronic illnesses being linked to the excessive use of pesticides in agricultural production. He got a rice mill through which he processes and sells good products.

5.6. Every Job Has Its Dignity

P M Surenderan resident of Meloor panchayath has won the award in best labourer by Krishi Bhavan, Meloor on 2021, on Farmer's Day, celebrated on Chingam 1, the first day of the Malayalam calendar. The dignity of labour is the philosophy that all type of jobs is respected equally. He started working from age of 13 and at 65 years he continues his profession by passion or sometimes by helplessness. Now due to COVID and rain work is reduced. So, he decided to go for MGNREGS with his wife and earning Rs 289. every labour work is equally important whether it's cleaning the house, doing manual irrigation, climbing coconut trees and street sweeping and those people working on the unorganized sector, much appreciated as they work for society, the invisible, underpaid people who run drive our cities.

5.7. Organic Farming as an Essential Tool for Sustainable Farming

Jiji George resident of Meloor panchayath is doing organic farming on 10 acres of land at Adichili. Major crops are vegetables and fruits among which are Banana, Mangosteen, Rambutan Nutmeg, Arecanut, Coconut, Papaya (Red lady).

For the past 15 years, he has been practising organic farming, traditional seed conservation, and scientific cultivating methods. He grows tomato, spinach, cucumber, okra, Brinjal, bitter gourd, cucumber, pumpkin, and chilli depending on the planting season (February-March, June-July, and October-November).

He turned Quarry (Parramatta) into a pond for fish culture and grew 5000 Tilapia for the first time as part of the state government's Subhiksha Kerala scheme, in 35 cents. Quarry may be converted into fish farms for less money, and it's a process that turns desolation into prosperity. It provides a means of subsistence, food security, and an alternate source of revenue.

He has indigenous cows and Desi hens. He is preparing organic manure 'Jeevamrutham' used in his land as only a nourishing substance. Well, apart from proper irrigation channels. The manure has a natural base of cow dung. He is using the dung that comes from the native breed of cows for a better yield.

He was trained in WDC-WDC- Waste decomposer is Biofertilizer manufactured by NCOF. WDC is Naturally synthesized by the Cow urine & other beneficial bacteria applied on his land.

Another method he followed is mulching. Organic mulches can suppress annual weeds and offer other important benefits, such as organic matter, nutrients, moisture conservation, soil protection, and moderation of soil temperature. Tree leaves chipped brush and other forest-based mulches are often beneficial to small fruit and other perennial crops in the farm.

He cultivated 1000 Bananas, 200 Red Lady papaya, 40 Mangosteen and 60 Rambutan with other crops. After an initial struggle of 10 years, the soil fertility of his land is good which improves crop productivity. But he didn't get a better price for his organic product because of cost and certification. [18]

Not only are first-time certification costs steep, averaging around 60000 per operation, but there are other certification costs involved as well. Some of the major certification costs include renewal certification costs, suitable organic land, livestock from organic origins and organic seed. First two years conventional certificate on third-year farmers get Organic certificate.

Government has to start some departments under Krishi Bhavan so that the certification process became easy, cost-effective and time consuming.

5.8. Oral Cancer Survivor Find New Outlook Through Farming

Mr Sakir Hussain was an NRI for 14 years till 2013. He was a chain smoker who gradually settled into a two-pack-a-day addiction. He uses tobacco in the form of cigarettes, chewing tobacco and snuff when he works overnight in the recording studio. In 2013 he has confirmed with Oral cancer and the next year for him and his family it was a nightmare. He realized that who stand with him during bad times. He endured chemotherapy, surgery and radiation many times and cope up with all stigma with the support of family and friends such as blame himself for his illness or feel left out, isolated and depression. He quit his job at Gulf and at that time his family and few friends supported him in his new endorsement. He planned to start agriculture in his own land and started from scratch.

In four years, he learned through his own experiment, during which he lost a significant sum of money. He is currently producing paddy (UMMA) on a 12-acre plot of land. (5 acres owned and 7 acres leased). Every year, he harvests 2500 kg of rice per acre and sells it to the Kerala State Authority for 33.45 per kilogram. The total cost of one acre is 35,000 rupees, and the profit he made is 45,000 rupees. He cultivates twice a year. Agriculture is lucrative when we can address important difficulties such as primary and secondary processing, supply chains, infrastructure that supports effective resource usage and marketing, climate change and timely payment.

It can take up to six months for payments paid with seed authority to arrive. His unwavering faith aids him in dealing with the difficulties that have arisen as a result of his experience. It now provides him a sense of purpose, and every part of his life is a blessing.

Figure 5. *Oral Cancer Survivor find new outlook through farming.*

5.9. Kollengode Block Level Vegetable Nursery

In 2015, Vijaykumari U and Sahadevan T established a Vegetable and Fruit Nursery with the help of the Kollengode Block Panchayath. The project's goal is to increase food and cash crop output while also making the block self-sufficient in planting supplies. Every year, the farmer grows high-yielding varieties of seedlings and planting materials for the Block. They grew 1,30000 trees and distributed them to seven Krishi Bhavans in the Kollengode Block. To protect saplings from natural weather disturbances such as wind, rain, hail, and frost, they use covered structures such as net homes and rain shelters.

Shelters have the following advantages: increased production capacity by reducing crop time, uniformity in plant growth, least amount of space used, easy to check plant nutrition, easy to handle and maintain, quick take off, grade, and shift for transportation, irrigation systems such as drips can be easily maintained, and better water drainage and aeration in pot media.

Every year in June, they begin planting and by July, they have distributed seedlings to several Krishi Bhavans. The department will pay them with Rs 2.50 per seedling.

The couple also started poultry farming with 10,000 hens. Broilers are the birds that are reared for meat. The young chicks are dropped by agencies with medicines and reared in brooders with the help of 25 bulbs of 100 volts to provide warmth and light and to rear the baby chicks during the first few weeks of life. As boilers are meat-producing bred, they grow quite faster and require more feed. The brooding time for broilers varies depending on the season and in summer. In summer they only need 2 weeks, while in winter they need brooding for around one month. After a month, the protective layers of chicks can be removed. At night, enough lighting must be installed. Poultry birds such as broiler chickens take a shorter duration of time to mature in 40 days and generating profit. Poultry products are not much expensive. The agency is providing Rs 6.50/Kg. Our role is to look after the broilers for 40 days. To start poultry farm we want panchayath light, shed and electrical connection. After every 50 days, we get a profit of Rs 50,000 after meeting all other expenses.

Figure 6. *Kollengode Block level Vegetable Nursery.*

5.10. Varghese Tharakan's 'Ayurjack' Farm: A Model Which Ensures Food Security and Water Conservation

Ayur Jack Farm, set up at Kurumalkunnu, Thrissur, owned by Varghese Tharakan is a beautiful tranquil farm spread across five acres of land having thousand Jack fruit trees (Plavu) and one lakh sapling. Purchased in 2003 as a rubber plantation, the lack of water and fluctuating rubber prices pushed him to make a transition. In 2008 as a casual visit to his wife's house, he brought a jack fruit sapling and planted it on the farm. After a few days of his own effort and research,

he conceived an idea of plant propagation, with a focus on the process of budding jack fruit trees. From Ayur Jack Farm wants to find solutions to the poor access to sustainable availability of adequate nutritious foods at the micro-level, i.e. village level. [18]

By 2012, he found all bore wells dug inside the farm and all the 35 open wells in and around the farm were dry. As a born farmer he didn't leave up the project. He developed a Scientific Water harvesting system (underground water balancing system) where we can find not a single drop of water loss. With a simple water harvesting technique in farmlands and residential plots, the damages caused by the deluge could have been considerably reduced and all 35 open well is recharged and now no shortage of water in the area.

The farm is maintained in an organic way and all the fertilizer and pesticides are prepared in a farm. He has developed many varieties of jack fruit trees whose average height is 5 to 6 ft when it starts to bear fruits. Trees normally begin to bear fruit within two years of time. In five-acre land, he planted 1000 jack fruit trees and one lack sapling. To achieve his objective, he is offering one sapling to each student of the school who visited his farm. Through his farm, he wants to take the mission of one jackfruit tree for each house.

Its community food and commonly used by different communities in India, especially communities in hilly areas during the rainy season from June to November. The four dimensions of food security, (i.e., Food Availability+ Food Access+ Food Utility + Food Stability) also cope with Environmental influence (Food Consumption +Food Production +Food Distribution). [17]

5.10.1. Access to Nutritious Food

Jackfruit is quite versatile. It can be eaten raw, cooked, ripe or unripe and tastes great in a variety of sweet and savory dishes. “Peeling and cooking the jackfruit was an activity that brought the joint family together earlier,” Every part of Jackfruit is useful and a single Jack fruit tree releases 13.16 tons of oxygen per year. One jackfruit in every house releases enough oxygen for each family. To meet the nutritional deficiency in children jackfruit produces high levels of vitamins and minerals. [17, 18]

5.10.2. Farm Productivity

Farm production increased to 20 percent every year. In 2018 the production was 40000kg from 1000 trees and by 2019 it increased to 50000kg from 1000 trees. Every year farm productivity will increase and income also shoots up. [18]

5.10.3. Adequate Health Benefits

The main reasons for cancer were modern foods, especially the content of Gluten. But for people with celiac disease, gluten must be avoided to limit the risk of other devastating health effects, such as malnutrition, anemia, osteoporosis, neurological effects, alopecia (hair loss), skin rashes, and thyroid problems. Jackfruit which contains almost every vitamin, proteins and mineral that human body needed, as well as a decent amount of fiber and zero Gluten. The jackfruit seeds contain phytonutrients such as lignans, saponins, and isoflavones play a significant role in human health.

5.10.4. Commercial Benefits

Every year, farmers get 100 kilos worth of jackfruit from each tree and are able to sell hundred tons of jackfruits annually. Demands for sapling are high and each sapling he is selling for Rs 250 to 1000 Rs. It’s going to be a major source of food security and fresh air as each tree releases 13.66 tons of oxygen per year. [18]

Figure 7. *Ayur Jack.*

(i). Banana Farmers in Kerala Battle Low Retail Prices

Banana is a widely perennial fruit crop grown in Meloor Panchayat due to high economical gain for small and marginal farmers throughout the year. Meloor is one of the largest producers of Banana in Thrissur District with an average of 2812 tons from an area of 75 hectares with average productivity of 30 to 35 tons per hectare. Moreover, 25 hectares were added to banana cultivation in Meloor Panchayat during Post COVID Period. 70 percentage farmers sell their bananas in Chalakudy market, 20 percentage in VFPCK and 10 percentage in Horticrop.[18] The overall objective of the study is to examine economically feasibility of banana production and the sustainability of by-products. It also examines the major role played by cooperatives banks, insurance schemes and agriculture departments which helps to enhance farmer’s income and also create job opportunities. Agriculture and allied activities provide the main source of livelihood and income to 80 percentages of people in panchayath.[18] The government should take all necessary measures and support the panchayat to start micronutrients, nutraceuticals (baby food), livestock feed, natural fibres, and bio-fertilizers units. As Cochin International Airport is 18 Km away panchayat has huge potential for export. The unemployment can be sorted out by supporting small and cottage industries sector for byproducts such as Chips, figs, flour, powder, banana pulp, food and infants, clarified banana juice. Farmers in Meloor Panchayat have been in bad debt due to continuous loss from last three years (2019-flood, 2020-21 Conona). Average cost for each banana from seedling to harvesting is Rs 400 and return even during Peak (Onam Season) get Rs 250. Tapioca is another major crop and now farmers got 5 Rs/Kg. Even Farmers are not able to meet labour cost.

(ii). COVID Lockdown as Boon Rather Than Bane for Farmers at Sarvatho Bhadram

Thanniyam gram panchayat is located at Anthikad Block

Panchayat 20 km from Thrissur, in Kerala, India. For generations, the men and women of panchayath have survived on agriculture. Although the village has good rainfall due to the inadequate supply of freshwater through the canals that have left their fields dry, improper barrage management at the estuarine mouths has caused saltwater to move inwards into their fields. The farmers have been using fertilizers and pesticides for a long time, which resulted in the high cost of cultivation. Most of the farmers left farming 17 years ago and hundreds of hectares became Culturable Waste-Land. Then in 2020 village adopted organic farming under the initiative of SARVATHOBHADRAM-ORGANIC.

SARVATHOBHADRAM-ORGANIC played a critical role in assisting small and marginal farmers to customize, adapt, and tailor the methodology to their needs. The Farmers Club formed in May 2020 with 50 members to generate additional revenues and also encourage farmers to graduate to organic farming. The aim of the club is to ensure food and nutritional security in Anthikad Block Panchayat. [19]

Key Intervention

A key intervention made through the program was to distribute seeds through SHGs to create kitchen gardens at homes. Meetings were conducted with farmers in presence of Thanniyam Agriculture officers. Farmers discussed their problems, chalked out solutions, and decided to form a group named SARVATHOBHADRAM-ORGANIC. Started the kitchen gardens which help to increase food diversity in the diets of the participating families and reduce reliance on the market for fruits and vegetables. The successful model was replicated to different wards of the Block by supplying fifty thousand saplings, seeds, and organic fertilizers to SHG groups to start kitchen gardens. The project benefited 6500 families by ensuring food supplies and nutrition through kitchen gardening in Block. The arrival of perishables from different states is down by more than half during COVID. Community-led initiatives help to meet the entire requirement of vegetables and fruits in the Block Panchayat. Scale-up and converted thirteen hectares of fallow land with organic vegetables and cultivating paddy in twenty-five hectares of Wetlands. [19]

Paddy at Twenty Five Hectares of Wetland

Wetland cultivation is different from other cultivation in many ways. The wetlands are low -lying tracts located 0.5 to 1m below Mean Sea Level (MSL) and remain submerged for about six months in a year. Rice cultivation in the wetland starts with dewatering low-lying fields. It is part of the natural drainage system and connected by small, large canals and ponds and linked to the sea.

Collectively, the group owns about twenty-five hectares of fertile having good rainfall and access to irrigation facilities. The members themselves defined their responsibilities and formulated guidelines for internal management. With guidance from SARVATHOBHADRAM-ORGANIC and support from Krishi bhavan (Agriculture office), they started with activities like selecting crop varieties, soil testing, seed testing, crop planning, and water budgeting and conservation measures. Every step was discussed by the group to find solutions.

More Sustainable Future

Because the cost of and the dependence on agricultural chemicals can often drive marginal farmers into losses, it became clear that organic farming is a more sustainable future for the group. SARVATHOBHADRAM-ORGANIC provided the farmers with training in preparing natural pesticides and fertilizers such as Jeevamirtham (a mixture of cow dung and urine, legume powder, and jaggery). [19]

Figure 8. *Sarvathobhadram-organic.*

The farmers, in turn, responded with maximum participation and the faith that through this new venture the livelihood of their entire village could be restored and a brighter future would await them. Many checks point is made on cannel to control the flow of water thereby reducing the velocity. “The group took the risk and tried something different,” “The result was selling a new crop for $.96 (Rs 70/ kg) against Government Minimum Support Prices of $ 0.40/kg (Rs 28.50). [19]

(iii). For the Sake of Survival, the Cow Shed Is Constructed Using Natural Resources

The floor is risen 1/2 metres above the ground. The ground is paved with cement, making it neither wet nor slick. Then, to protect the cow from disease, lay a rubber mat on the floor. On each of the four sides, a four-sided cement wall is built. The structure is 30 feet by 9 feet in size overall. The walls rise up to 5 feet utilising the arecanut tree, keeping other animals at bay. Make small feeding cavities with a 1/2-foot width at the front wall. The slopped ceilings and little entrance doors are made possible by strong centre poles made from aged coconut trees.

Another two poles are kept on the front and back areas to support the roof. The centre pole is in the shape of 'V' shape and the structure is supported by coconut rafters, which gives strength to the structure. Then use coconut leaf (Olla) to weave a thatched roof. The total number of leaves required for the thatched roof is 132. (22x6 bundles). On top of the thatched roof plastic sheet is tied to get an extension up to 3 years. For fresh air and sunlight, all sides are open. The shed's entire construction cost is Rs 90000 for a 3 foot shelter with four calves and one cow.

Similarly, if the roof is replaced by mud tiles (Odu) then the cost slightly increased and reaches Rs 100000. Mrs Rajitha M D and Mr Binesh K S farmer constructed two low-cost cowsheds using natural materials and doing dairy

farming at Kodakkra Panchayat, Thrissur. He owns 4 cows and 4 calves and got 22 liters of milk. He is cultivating CO4 and CO_2 grass on leased land. To balance the source of essential nutrients and to increase milk production he feeds CO_2 grass, Straw, Kerala feed (Elite), Soya feed and rice feed (Thavidu). He receives a subsidiary of Rs 12,000 under Govardhini Scheme for calf feed (4 -30 months). He sells the milk to local residences and shops at the rate of Rs 60.

The major problem faced is the rising cost of feeds. Last year the price of Kerala feed (Elite) was Rs 850 and now it shoots up to Rs 1245 for 50 kg bag. It's a success story of small-scale dairy farm and low-cost cow shed both of which is an essential source of income and nutrition in rural communities in India**.**

Figure 9. *Cow shed is constructed using natural resources.*

(iv). Goat Farming as an Alternative Income-Generating Activity

Mrs. Neethu Aby and Aby Karunakaran have created a low-cost goat shed that can accommodate 15 goats. Its key characteristics are a 17sqftX6sqft galvanised iron (GI) frame and a fibre refined plastic interlockable slat floor. The entire cage is 5 feet above the ground and has a floor space of 5 square feet. The shed was designed so that all droppings are gathered in a net held 3 feet above the ground below the cage, and urine is collected via pipes. It can be collected every two days and used as manure on their own 40-cent plot of land where bananas and vegetables are grown. Apart from that, it features a feeding bowl that is positioned 1.5 feet outside the goat shed so that a person can simply roam around and feed the goats. Automatic drinker that ensures water consumption which is easy to use and maintain. They keep a separate plate to feed the goats, ensuring that there are no infections, appropriate hygiene, sanitation, and a healthy atmosphere for the goats. The initial cost is Rs 80,000 and it lasts for 10 years. It can be easily dismantled, relocate and reassemble.

Socio-Economic Benefits

Both of them began goat rearing as a source of income in 2019, along with farming on 40 cents of land. They paid Rs 20,000 and brought a pair of Malabari goats. They now have 15 goats and each goat conceives and breeds three times every two years. It gives birth to two or three kid in each breed. The goats are fed jackfruit leaves (dry and green), CO_2 grass, and Godrej pellets (150gm each goat per day). They sold 5 litres of milk per day for Rs 150 per litre. Every seven months, the goats are sold for Rs 8000 each. After a year, they sold each pair of goats for Rs 25,000 each. After one year, the goat whose meat had an average weight of 24 kg and was sold for 15,000 Rs. 3 kilogram of manure was sold for 250 rupees. Couples believe that if a family has four goats, they may easily make a respectable livelihood. Goat is a poor man's source of income and insurance, which is used in times of need. Farmers can generate a solid and steady income with little investment.

Figure 10. *1 Goat farming.*

(v). Quail (Kada) Farming: One Bird and Two Ways of Earning

Vismaya JLG started in 2015 at Nemmara block, supported by Jan Kissan farmers producer company. Four neighbouring members come together and opted for quail farming as a self-employment and income generation activity. Initially, they started their business with 3000 and gone up to 5000 kadas. They took a loan of 2 lakhs from Bank of Baroda and repaid the amount.

Quail (kada) one bird and two ways of earning. One for egg and one for meat. Each quail fetches up to 250 eggs a year. They keep each kada for 9 months after they sell it for meat. Each egg is sold for Rs 2 and meat for Rs 30.

Quail eggs also contain healthy essential fatty acids, like omega-3 and omega-6. Each serving of quail eggs provides you with 13 percent of your dv for protein.

Light plays a vital role in the case of egg production. 16 hours of lighting is required daily inside the quail chicks in a brooder house. 50 kada can be raised in a cage measuring 120cm length x 60 cm wide x 25 cm in height. The disease is low and management as easy as it's raised in cages. Quail feeds available in the market are used as feed.

Due to COVID sales were reduced, competition is higher and price of the egg is the same and the price of feeds is raised. So forcefully reduced the kada to 1500. The average income for each member is Rs 5000.

Backyard poultry farming is sign of nutritional socioeconomic and women’s empowerment.

Ensuring local food self-sufficiency- it explore the potential of local food to meet local demand.

Figure 11. *Quail (Kada) farming.*

(vi). JLG -Doing Organic Banana

Vasanth Lakshmi -JLG is a shareholder of Sreekrishnapuram organic farmers producer company ltd., which was created in 2018 under ICDC. Mrs Vasanthalakshmi, Mrs Saranya, Mrs Shobana, and Mrs Rajani are the four members. The four members are enganged in vegetable farmers. Banana (Nendran), Elephant Foot Yam (Chenna), Ladyfinger, Brinjal, Cowpea (payar), Ash Gourd (kumbalanga), Ginger, Turmeric, and Chilli are the most common crops.

JLG looks forward to Onam season since it is the time of year when bananas (nendran) sell for the highest prices. They began preparing for Onam a year in advance to secure a better price.

However, two floods and a COVID outbreak in the previous three years have wreaked havoc on small-scale farming. It had a significant impact on small and marginal farmers, as well as the majority of JLGs and SHGs. The JLG took out a loan from Kerala Gramina Bank Cherpulassery and is repaying it with a monthly EMI of 4000 rupees. They leased a one-acre plot of land for Rs 5000.

They also save Rs 1000 in the post office saving scheme's national savings recurring deposit (SB) and Rs 100 in Kurri, and sell veggies to local shops and directly to cash and carry retailers.

Before COVID, each member earned an average of Rs 6000 per month, but after COVID, the price of vegetables fell, and their earnings fell as well.

Agriculture is extremely reliant on favourable weather; if the weather is excellent, they can sell their products for a higher price. It also aids in the identification of settlements that meet their food and feed needs based on current and prospective agricultural yields.

Throughout the year, the women secure food security for their family. It makes a statement and serves as a symbol of women's empowerment.

Figure 12. *Organic Farming.*

6. Issues and Challenges

Small and marginal farmers face a variety of issues, including low product prices, rising input costs, a lack of credit, inadequate insurance, a lack of scientific cultivation practises and technological know-how, high transportation costs, poor access to water and land management, irrigation, command area development, and electricity grids.

Role of women: Women's role in agriculture has grown in prominence, and women now account for a significantly larger proportion of rural men. [7] Men from the countryside are migrating to cities and towns in search of better pay. From land preparation to harvesting, as well as animal husbandry and dairying, seafood processing, collection of non-timber forest products (NTFPs), backyard poultry, and collection of fuel wood, fodder, and other goods for family requirements, women play a critical role in agriculture" (GOI, 2007). Despite the fact that all women are denied land deeds and access to other productive resources, protecting women's land rights, improving infrastructure support for women farmers, and providing legal support on existing laws will make it easier for women to be recognised as farmers and gain access to credit, inputs, and marketing outlets. The expanding role of women in agriculture can be empowering if women have a greater say in decision-making and the control of household resources. [9, 10]

6.1. Vulnerable Group

The proportion of socially vulnerable Group is around 22% those comes under small and marginal farmer’s category and farmers belongs to ST and resides inside the forest. The indigenous people having their own farming system and provides a significant portion of revenue in tribal hamlets; in some areas, agriculture income accounts for the majority of household wages [6, 10]. The loss of traditional seeds; and a rapid shift in food habits among the young, influenced by processed food marketing campaigns. According to anecdotal evidence, indigenous adolescents are gradually abandoning their food systems. Thousands of culinary and medicinal plants, as well as the forests, mangroves, lakes, savannas, grasslands, and mountain ecosystems that they call home, could be lost forever on the name of development. Gradually modern farming technologies overrule the system and the community farming system is slowly vanishing. [11]

6.2. Land Issues

The majority of tribal farmers in the forest area lack land titles, making it difficult for them to obtain institutional finance and other services offered to farmers with titles. One of the top priorities is to record and register actual cultivators, including renters and women growers, and to provide them with passbooks so that they can access institutional loans and other inputs. [12]

6.3. Agriculture in Unorganized Sector

Agriculture in India is largely in unorganized sector.

Cultivation, irrigation, harvesting, and other activities do not involve systematic institutional and organisational planning. Institutional finances are insufficient, and the government's minimum purchase price does not reach the poorest farmers in a timely manner. The percentage of area under high yielding varieties is also inversely related to the size of the farm. [13]

6.4. Exploitation of Farmers by Middle Man

The reason for farmers not receiving the optimum price for their produce is because of middlemen's exploitation. In Kerala the government started many good models like VFPCK's, Supply Co, Horticorp (Farmers Market), where the farmers can directly sell their products at reasonable price. This has aided farmers in selling their produce by eliminating the need for a middleman and allowing for greater price discovery through group decision-making. [14]

6.5. Real Estate Mafia

Even fertile land best suited for agricultural use is being sold to real estate agents, who prepare plots and place attractive advertisements in order to sell at a premium. To avoid land grabbing, rigorous procedures and laws must be implemented. [16]

7. Solutions to the Problem

7.1. Promote JLG's and SHG's

More JLG's and SHG's must be promoted and every institutional supports like financial, government schemes, trainings, input subsidies should be provided and promoted in groups. [16]

7.2. Special Agricultural Zone

It is critical to create special agricultural zones based on climate, area specific goods, and irrigation facilities, where only farming and agriculture-related activities should be permitted. Economic prosperity in rural areas can be achieved by introducing innovative farm techniques among youths that guarantee jobs and revenue. Only by implementing new technologies at the micro level and involving rural youth can this be accomplished. Crops with higher yield potential and better pest resistance should be developed as a result of ongoing research. [8]

7.3. Need for Meaningful Crop Insurance Policies

To determine a farmer's reimbursement, traditional crop insurance relies on a direct measurement of the damage he or she has sustained. However, because the majority of our farmers are small-scale, field loss assessment is typically impractical or too expensive. Index-based insurance, on the other hand, is based on a set of parameters and the insurance has the benefit of being transparent and treating all insurers within a specific geographical area equally. It has low operational and international costs, and timely payouts are guaranteed.

7.4. Scientific Water Management Needed

Irrigation systems that are currently available do not cover all of the cultivable land. Aside from locations where the perennial rivers flow, the majority of agricultural lands lack irrigation. Water scarcity is most often caused by a lack of adequate water management rather than a lack of water. Improved modern rainwater harvesting systems, such as rainwater storage on the surface for future use and groundwater recharge, should be developed. Water management can be improved through interstate cooperation on water resources, which allows surplus water from perennial rivers to be redirected to areas in need. Check dams, nala bunds, cement plugs, gabion structures, or a percolation pond can be used to spread water in streams/Nalas.

7.5. Need for Agromet Advisory Services

Due to climate change, managing weather and climatic hazards in agriculture has become a major concern. Facilitating a national weather risk management system that informs farmers when extreme weather is imminent would go a long way toward decreasing agricultural losses and ensuring food security. Weather and climate data can be used to make better-informed policy, institutional, and community decisions that minimise risks and boost opportunities, raise crop, livestock, and fisheries output, and improve the efficient use of scarce resources. Data provided by National Meteorological and Hydrological departments play a critical role to farmers of all sizes. Farmers' decision-making can be aided by effective weather and climate information and advisory services, which can help them better manage agricultural risks. Such services can aid in the development of environmentally sustainable and economically viable agricultural systems, as well as the improvement of production and quality, the reduction of losses and risks, the reduction of costs, the increase of efficiency in the use of water, labour, and energy, the conservation of natural resources, and the reduction of pollution caused by agricultural chemicals or other agents that contribute to environmental degradation. [18]

7.6. Educate the Farmers

Farming education begins in the classroom and from Schools. All techniques and modern agricultural procedures, as well as a farm school, should be implemented in rural areas. More agriculture laboratories could be established at the school level. Crop rotation instruction should be provided to farmers. Though urban schooling has improved significantly, the government should adjust policies for rural areas in general and the agriculture sector in particular. More research grants and scholarships should be given to students in rural areas. This is one of the reasons why farmers are unaware of the government's different programs.

8. Conclusion

In an Indian village, the number of small and marginal farmers, as well as their long-term sustainability, is crucial to the village's prosperity. Climate change is putting farmers' livelihoods and incomes at risk, so they must increase production by better utilising their land resources. The best method to find a solution is to enhance the FPCs and supply chains in each district. [15] The FPCs in each district are equipped with climate-smart technologies and infrastructure support, but they need more financial and technical assistance to aggregate, store, pack, brand, and market their products. FFCs can save transportation costs and improve their negotiating position for farmers' produce by aggregating. Supporting FPCs will assist to address rural employment challenges and offer small and marginal farmers with a new source of income and livelihood. Women should be encouraged to join JLGs and SHGs and participate in a variety of activities that are supported by banks, KVKs, the Agriculture Department and Research Institute, and insurance companies, as well as to provide logistics tools to sell their produce directly to customers. [14] The various case studies mentioned above aid in identifying various JLG and SHG programs that provide a wide range of services to members, including financial, insurance, and social security services, as well as business and leadership training, enhancing the economy of villages and leading to self-sufficiency.

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