

The Role of Urban Agriculture in a Secure, Healthy, and Sustainable Food System(A case study of NIRAVU experiment at Kozhikode Municipality Kerala)

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ABSTRACT

Urban Agriculture is not a new concept, but the popularity or importance of UPA is increasing because of the high urbanisation. Urban and Peri-Urban Agriculture (UPA) is more popular and active in many developed and developing countries and it is not considered as a leisure time activity but as a method to address the issues of nutrition, unemployment, food security and healthy lifestyle. Here an attempt is made to understand the sustainability and possibilities of Urban Agriculture. The experiments like Niravu (Native word- meaning 'repletion') has emerged with the initiative of people. The study was an effort to inquire into the 'Niravu' experiment in Kozhikode with reference to sustainable agriculture. The objectives of the study were to understand how the experiment had met the requirements of food security, nutrition, income generation and climate change and the study was explanatory in nature and it seeks to understand Urban Agriculture and its implications.

Key Words: Urban and Peri-Urban Agriculture, Sustainability, Food Security, Life-Style

Introduction

The first thing that academic analysis of urbanagriculture reveals is that the practice has both chameleonand Phoenix-like characteristics. It adapts and modifies itselfto the environment and demography where it finds a social oreconomic imperative and it rises periodically, out ofnecessity, from the refuse and ashes of civilization'ssuppression of viable life in overburdened dense centres ofour cultures - their cities. (USDA 2006) Urban agriculture is at times thereflexive response for survival of people with few optionsand at other times the thoughtful long-term organization ofresources to moderate the harshness of the urbanenvironment. Urban agriculture has almost as manydefinitions as locations. Asian countries, in general, have a long tradition oforganized urban agriculture. It is intensive and widespreadacross the region promoting the agricultural recycling ofwastes. There is a great diversity of products. There iscontinuity from the past that allows it to currently beaccepted as a normal urban land-use function in most Asiancountries (USDA 2006). As an example, many cities in China are able tobe self-reliant in non-grain foods. Singapore is 25% self-reliant in vegetables and 100% in meat.In Asia, urban agriculture is dominated by women. Japan has little cultivatable land as a country, increasing the tendency towards urban agriculture and it is one of the only countries that take a regular census of urban agriculture activity. In Asia, both seeds and tools have evolved over time for the use of urban agriculture.

The Indian Scenario

According to Indian economic survey 2017-18, the total workforce of the agricultural sector would drop to 25.7 per cent by 2050 from 58.2 per cent in 2001 (IES 2018), which means the entire burden of food production for the country will be with the 25.7 percentage rural population. Both urban and rural areas are going to face a lack of food security, employment and sustainable income generation and it can be seen as a major threat towards sustainable development. The major factors behind the migration are agriculture failure and unemployment. Climate change will make more damages to developing countries like India and it is going to affect our food productivity and agriculture. This will make changes in our crop yield. The climate change such as increasing temperature and short and heavy rainfall are creating floods and droughts, in rural India, the numbers of hot days are increasing throughout the agricultural season and leading to poor crop yields. India, being an agricultural state, urban agriculture has been a traditional activity at household, which has its origin in kitchen food-waste management, but India is not taking urban and peri-urban agriculture as a serious measure to tackle the increasing urban issues. India's first-ever National Agriculture Policy-2000 is not even giving much importance to urban agriculture. And in the National Policy for farmers-2008 has mentioned about urban farmers and Agriculture as follows: "In urban areas, home gardens and nurseries would be encouraged. Nutrition gardens would be supported to supplement the nutritional requirements".

In the financial year 2011-2012 the central government has launched a new scheme on 'Vegetable Initiative for Urban Clusters' (VIUC) with an outlay of 300 crore under Rashtriya Krishi Vikas Yojana (RKVY) to improve production and productivity of vegetables, increase of farmers' income in cities, and to provide good and fresh vegetables for the consumers on a fair price. The scheme was tried to meet all aspect related to vegetable initiatives from production and supply, establishment of an efficient supply chain, formation of farmer groups, disseminating technologies for enhancing production, assist states in addressing the whole value chain from the stage of pre-production to the consumers table, training and capacity building for skilled and unskilled vegetable growers in the identified clusters. Small Farmers' Agribusiness Consortium (SFAC) was entitled as the nodal agency to support the state government for providing technical and managerial help in implementing the scheme. The implementation of this programme was clearly created in a method that membership-based Farmer Producer Organizations (FPOs) have been made as primary beneficiaries. Within the implementation of one year, this initiative envisages mobilizing over 1.00 lakh farmers all over the country. But these initiative has not made any significant change in Indian cities.

Indian Urban Agriculture Experiments

Other than this there is a small number of urban and peri-urban agriculture programmes are initiated by the individuals and organisations in Indian cities. The major initiatives which have become successful within the limitations are Dr Doshi's City Farming in Pune and Organic Farm of Mumbai Port Trust. Dr Doshi started to use kitchen waste, compost for vegetable cultivation and garden soil in poly bags, tires, drums etc. and his method of farming is chain farming and the water use in his own 'Doshi-system'. Dr Doshi founded the "International Institute of City Farming" and the institute provides lectures and awareness programmes, offers consultancy services, issue publications, and provides support in forming city farms.

Mumbai port trust is showing a model for the entire country. With the help and training of International Institute of City Farming, the Mumbai port trust has developed a farm. It is formed in the rooftop of the central kitchen and the farm is started in around 3000 square feet. Basically, the farm was started for kitchen waste management in a sustainable and eco-friendly manner. Then it became an initiative which is not only for waste management,

fruits like pomegranate, guava, sugarcane, and a range of vegetables like ladyfinger, tomatoes, and radish are produced around 275 plants started to cultivate. In 2003, the organic farm got the 2nd prize of the National Council of Friends of Trees in the annual show.

Urban Agriculture in Kerala

Urban agriculture in Kerala is in an emerging stage like rooftop farming and gardening etc. the State Horticulture Department is giving more thrust on urban and peri-urban agriculture initiatives across the state and the state department is also giving training for interested people in rooftop farming. To a certain extent the 'Vegetable initiatives for urban cluster' is making progress in Kerala. Even though the initiatives are too small and not received much attention, but it helped to create an awareness in the society. The experiments like Niravu is emerging with the initiative of people. Therefore the study is an effort to inquire into the Niravu experiment in Kozhikode with reference to sustainable agriculture. Moreover, the study will try to understand how the experiment has met the requirements of food security, nutrition, income generation and climate change.

Study Area

Kozhikode, also known as Calicut, is a Tier 2 Metro city in Kerala, India and the headquarters of the Kozhikode district. The Kozhikode metropolitan area is the second largest urban agglomeration in Kerala with a population of 2 million as of 2011. It was ranked eleventh among Tier-II Indian cities in job creation by a study conducted by ASSOCHAM in 2007. According to data compiled by economics research firm Indicis Analytics in 2009 on residences, earnings and investments, Kozhikode ranked as the second-best city in India to reside in (lbnlive.com). Calicut is one of the biggest economic hubs in Kerala. The service sector dominates the economy followed by industries. Kozhikode features a tropical monsoon climate (Köppen climate classification Am). The city has a highly humid tropical climate with high temperatures recorded from March to May. A brief spell of pre-monsoon Mango showers hits the city sometime during April. However, the primary source of rain is the South-west monsoon that sets in the first week of June and continues until September. The city receives significant precipitation from the North-East Monsoon that sets in from the second half of October through November. The average annual rainfall is 3,266 mm. The weather is milder from December/January until March when the skies are clear and the air is crisp. Winters are seldom cold. The highest temperature recorded was 39.4 °C in March 1975. The lowest was 14 °C recorded on 26 December 1975.

Objectives of the study

The main objective of the study was to understand the potential of the Niravu experiment as a replicable model.

- To study the Genesis and origin of the Niravu experiment.
- To study the scope of activities of the experiment.
- To know how far the experiment met out the question of food security, nutrition, income generation, climate change, energy conservation and waste management.
- To study the ways and means adopted by the Niravu team to make it a sustainable model.
- To understand the problems and prospectus of the experiment.
- To suggest ways and means strengthen the experiment to become a sustainable model.

Methodology

The method of the study was descriptive in nature. The descriptive research design is a qualitative research design used to describe the observation and phenomenon being studied. Since the study is to understand the subject in depth the descriptive method was adopted.

Population and sampling

The study conducted in Niravu residential association in the 10th ward of Kozhikode Municipal Corporation. The Niravu Residential association is having 149 households, 101 houses took part in the Niravu organic village experiment at the initial stage. The samples for the study was decided to be 25 households (purposive sampling) from Niravu organic village and the same number of the household from neighbour Residence Association. The researcher also interviewed Krishi Officer and expert from Kerala SasthraSahithyaParishad (KSSP).

Result and discussion

The Niravu organic village was formed in the year 2006, November 1 on the Kerala formation day, inspired by then chief minister of Kerala V. S Achyudhanandan. He encouraged the citizen of Kerala by saying that the social workers to become involved in minimum one task with total commitment for the development of the state on the Golden Jubilee year. Some of the residents of Vengeri who is actively involving in the social activism decided to conduct a socio-economic survey of Vengeri with the help of the neighbouring Providence Women's College National Service Scheme unit. They had trained 100 NSS volunteers for the survey and collected detailed data from 1824 households.

The findings from the survey were shocking for Vengeri residents. The survey found that many of the residents had different diseases among them seven of the residents are diagnosed with cancer. Here out of the seven cancer patients five of them were women. In 2006 a small urban area like Vengeri which is 8 km away from the main city and a less polluted area compare to the main city and people mostly believed that the bad habits like smoking and drinking are the major reason for cancer. So it made the activists look in the issue more seriously. The activists consulted the oncology department of Kozhikode Medical College for expert opinion on the issue. The oncology department of medical college found that toxic gas which is released from the plastic while burning for the kitchen needs and other purposes and the chemical content in the rice and vegetables due to over pesticide usage can be a reason for the issue. This understanding led to the formation of Nirqavu village.

At the initial stage, the organic village project was started with 101 households of Vengeri area after conducting continuous discussion and meetings. Later the number of households increased in the resident's area due to the increased inward migration and urbanization. Hence the number of households in the organic village increased from 101 to 149 at present. And in the year 2009 the association was registered under the societies registration act and became a residential association. The residents association was named as Niravu which means 'repletion' Till 2016 Niravu organic Village was working as a residents association and with a farmers club of that resident's association. In the same year, November 24 the farmers club of Niravu registered a Niravu Farmers Producing Company as a value addition to the initiative. Even though the initiative for the project was taken by the individuals it became a collective initiative after the formulation of residence association.

Niravu is now getting financial assistance from Kerala Agriculture Department, NABARD, Energy Management Centre, Ministry of Environment, Forest and Climate Change and Centre for Environment and Development. The Technical support is getting from the Centre for Water Resource Development and Management (CWRDM), Kerala Agriculture University, NIT Kozhikode and Kerala SasthraSahithyaParishad (KSSP). And Niravu volunteers were received expert training from IIM Kozhikode about Leadership for Social Development, Rural and Social Entrepreneurship.

I. The scope of the activities of the experiment.

The researcher interviewed 25 household of Niravu to understand the scope of the activities of the Niravu experiment.

Bring Back the Tradition of Agriculture

The urbanization and inward migration made Vengeri a full-fledged urban residential area. The increasing urbanization and lure of white-collar jobs slowly distracted the urban dwellers from agriculture and they were no more interested in agriculture. The urban people are unaware of the old agriculture tradition and practices. The respondents stated that by promoting urban agriculture or organic farming initiatives the Niravu experiment tries to bring back the tradition of agriculture. Niravu is growing crops that are native to the region like Pulses, Pepper, Desi Paddy, Coconut, Banana, Mango, Brinjal, Ladies Finger etc. By collecting seeds from the rural areas Niravu created a bank of native seeds and avoided the hybrid and genetically modified seeds. The respondent put up VengeriBrinjal as an example of the conservation of traditional agriculture. VengeriBrinjal is an indigenous variety of Brinjal with average 44cm of length and 12.5cm thickness. Niravu received the seeds of the Brinjal from the oldest resident of the association which is considered as lost. After getting the seeds Niravu produced 100,000 Brinjal saplings as part of the protest against the B. T Brinjal. And later the indigenous variety the Brinjal has received the certificate of merit from the Kerala Agriculture University and named as VengeriBrinjal.

Reawaken the Culture of Farming among the New Generation

It was not enough to hold the youngsters in the initiative, so they have created a collection for the youngsters and children and gave them the responsibility to make a team for the cultural programs of Niravu. This young team of Niravu is conducting dramas and street plays about organic agriculture and sustainable ways of life. The youngsters have the entire role to design the play and conduct the programs. The initiative is giving space for them in the interaction with Medias, allowing them to handle the seminars, training and classes which is conducted by Niravu. By creating a new initiative like IT @ Niravu for creating or developing software programs and IT-enabled technologies by Niravu farmers club involved the youngsters in the initiative.

Protecting the Environment from Toxic Fertilizer

The ideas about the Niravu organic village itself came from the understanding of the impact of toxic fertilizer and its pollution and how it badly affects their health and surroundings. In the wake of seven residents are diagnosed with cancer the Niravu residence decided to go back to the organic farming. As a first step, the Niravu residence association decided to start organic farming in one-cent land of each household and those who did not have space in their land they are decided to cultivate in the rooftop of the house. Niravu was consist of 63 acres of land, out of the 63-acre land 30 acres had become part of the organic farming. In the year 2008, Niravu became the first organic farming village in the Kerala state and Zero-

pesticide certificate to Vengeri vegetables was also received from the Pesticide Reduce Research and Analytical Laboratory of College of Agriculture, Vellayanai, Kerala.

Efficient Waste Management

Among various environmental problems, the issue of solid waste management is an important and burning issue especially in urban areas Vengeri is not an exception. The authorities are trying to tackle this issue from a long back. But Niravu is managing their waste by initiating a project called 'Jaivasree' (Prosperity from organic manure). The initiative is to make the residents waste-free and cultivate needed vegetables. Niravu is scientifically dealing the waste management by segregating the biodegradable and non-degradable waste.

The biodegradable waste like kitchen waste is disposing at the source itself. The biodegradable waste is composting mainly through biogas plants and compost pit. And other composting models are also using like vermin compost, bio bias, pipe compost etc. the residents have one biogas plant for every four households. Around more than 30 plants are using in Niravu. The manure is used for farming as fertilizer. The non-bio degradable waste like plastic, leather and glasses are collected and segregated in bags within each household. And these items are sent to Niravu Karnataka recycling plant.

Energy Conservation

The energy utilization of urban areas is very high. The utilization of energy in the house like electricity and cooking fuel are increasing day by day. Niravu is also involved in energy conservation, for that they have initiated the programs called 'Urjasree'. This initiative promoted the use of LED Bulbs among the households and Niravu started to produce and distributed the LED Bulbs. The Solar panels also encouraged by the initiative, so some of the households are also using Solar Panels. The cooking fuel is another important energy which is needed for every household for everyday life, for that Niravu residence are using biogas plants. And one biogas plant can provide around two and half hour gas for cooking.

Water Conservation

Niravu is located in a slop of the high land, they often face water scarcity. The water scarcity during the summer season and at that time the residence is depending on the corporation water from the corporation pipeline. This situation encouraged Niravu to look into water conservation. Niravu is conserving water through rainwater conservation by well-recharging technology, rain pits and paving the land with pebbles. And Niravu is also planning for a new project to conserve the rainwater by making a big lake in the rainwater catchment area of Vengeri.

Agro- Tourism

Niravu is an organic farming urban village and now they are promoting Agrotourism. The respondents defining Agrotourism as farm tourism, which means the tourist from across the world are welcome and can come and stay in the houses of the Niravu. The tourists can visit the farm and they can study the ways and traditions of farming. Niravu is emerging in agro-tourism. Till now Niravu has received tourists from Norway, United Kingdom, Canada, Germany, France and Italy. One house of the Niravu is prepared to host the tourist. The tourist homestay and agro-tourism should follow the rule and regulations of the state tourism department

II.The Question of Food Security, Nutrition, Income Generation and Climate Change**Food Security**

The urban agriculture is considered as the way to address food security. Vengeri is on the way to achieve self-sufficiency in different sectors. The Niravu resident is consisting of 60-acre land and out of that 30 acres is using for organic vegetable cultivation.

The respondents said that they are cultivating native vegetables which can be grown in this climate. Some of the selected items like Carrot, Potatoes, Beetroots etc. cannot be grown in this climate. Non-availability of land for paddy cultivation is one of the pressing issues of the Vengeri experiment. The households are only buying those vegetables from outside which are not cultivated on their farm. But the respondents stated that they have 100% food security in all the native crops whatever they are cultivating.

Nutrition

The level of nutrition and health improvement is considered as the important objective of urban organic farming. The core thrust behind the Niravu experiment itself was health reasons. The respondents were in a united voice while saying that they have an improvement in their health. Niravu is keeping record about the health status of the residence, in that they used to record all the diseases of each and every one of the residents. The respondents stated that after the initiation of the Niravu experiment serious health problems were not reported. And none of the residences was not affected any serious health problems than the common diseases like fever and cold. And the respondents were describing that organic and fresh food availability and consumption is increased in their houses. The availability and consumption of organic food will lead to an improvement in the nutrition level. But even though there was no study conducted among the household to find out the level of nutrition and improvement of the health of the Niravu residence.

Income Generation

Table no 4.1

Monthly Income	Number of Houses
Less than 1000/-	4
1000 – 1999/-	4
2000 – 2999/-	7
More than 3000/-	3
No direct financial benefit	7

The income generated from farming is shown in the table. The vegetables which are produced in the households are selling through the Niravu outlet and the vegetable which is selling through the outlet is the excess products after the household use. As an income from the vegetable production, out of 25 households, 4 households are only getting less than 1000 rupees. Around four households are getting income in-between 1000 to 1999 rupees. Almost seven households are monthly receiving up to 2000 to 2999 rupees income. Out of 25 households, only three households are monthly getting more than 3000 rupees as income. And around 7 households are not getting any direct financial benefit because their

production is only limited to their own needs, but the consumption from the market is reduced. Every household in Niravu reduced their consumption of vegetables from the market and because of that the overall spending on the food items was also reduced.

Apart from this the Niravu farmers producing company which is started in the year 2016 is selling the products like Chilli Powder, Jack Fruit Chips, Halwa, Ice Cream, Pickles, Jam, Squash, Other Grain Powders etc. 10% of the sales amount is taken for the company expenses and the rest of the 90% sales amount is directly given to the farmers. Most of the production work of the marketing items is done by the women of the houses. The annual turnover of the company is around Rs. 5.22 crore.

Out of 149 households, one household is keeping a cow for the fertilizer needs of Niravu organic farming. The Kasaragod dwarf desi cow was specially brought for the use of Vengeri residents. The cow's yield is around 2 litres per day and that is sold out at 100 rupees per day.

Climate change

Climate change is an important issue which is rising. The Niravu residence also taking part in the protection of the environment and controlling pollution. The respondents said that the plastic was the main villain they had. The people used to burn the plastic for the kitchen needs and for removing it from the surroundings. The pollution which made by burning plastic was very dangerous. By scientifically managing the plastic waste like segregating it and sending to the recycling unit the pollution by burning plastic is reduced. The residence is no more burning the plastics. And according to the respondents increasing vegetation in the urban area by the vegetable cultivation is also helping to reduce the air pollution and high temperature. But even though there are no scientific studies conducted to analyze the contribution of Vengeri in the reduction or controlling of climate change in that particular area.

III.Strategies/ Methods adopted for the Sustainability of the experiment.

The researcher has collected the data for the strategies/ Methods adopted for the sustainability of the experiment by using an observation checklist. By observing the respondents households and by interacting with the respondent the researcher analysed the methods adopted for the sustainability of the initiative.

Collectivity

One of the strategy or method which is making the Niravu experiment sustainable is their collectivity. The Niravu residence area was the same as any other urban residential area like even they were not aware of their neighbours. But the Niravu experiment which had come up with the formation residents association helped to develop a strong collectivity among the residence. At the initial stage of the Niravu, the collectivity was only developed through the formation of the residential association. The collectivity among the elders and youngsters are also developed in a friendly style. The youngsters are formed their own collective or group for the Niravu cultural activities and the elders are also keeping a good relationship among themselves through the residents association and farmers club. The women and children's in Niravu are keeping good relation with each other. The researcher observed that the residence developed a strong relation to each other, which allow everyone to enter everyone's house without any hesitation and permission. In an urban area, this kind of relationship is difficult to develop. Without any discrimination like caste, gender, religion, money and age Niravu is keeping a strong collectivity. Members are giving respect and space for everyone to express their views, whenever the Niravu is taking any decision then it will be directly discussed in the residents association and in farmers club.

Future Plan

The future plan was another strategy or method to analyze the sustainability of the experiment, the researcher analyzed it through the interaction and observation of the respondent. The Niravu organic village and farmers club are working with a detailed future plan. The Niravu team is aiming to develop the village into a model for the entire nation. The team is working toward to make it as a self- help village and self- sufficient village. The initiative is small but the team want to spread the message of sustainable life and living to the nation. As part of spreading the message, its benefit to society and as a value addition to their work Niravu farmers club formed farmers producing company and started to sell their products through the outlet. The Niravu farmers producing company is taking more projects across the state. These projects are mostly for the waste management, till now Niravu is working with various Panchayats in more than four districts of the state and they were the partners of Kozhikode Corporation and Calicut airport for their waste management.

Technology (people friendly)

The technologies used in the Niravu experiment is more people-friendly. The total 149 families are using the same technologies, the farming techniques, waste management, water conservation and energy conservation techniques and are more accessible. However, the researcher found some difficulties in the practical side. After conducting long training and attending classes only the technologies whatever using in Niravu is taken. Water conservation is done through some traditional and modern techniques. The traditional techniques like digging rain pit and modern techniques like a well-recharge in the rainy season are the major ways using for water conservation. The cost of the well-recharging plant is less and the digging of a rain pit is not at all costly. So the water conservation methods are more accessible and people-friendly.

Women Participation

The women members are active in the works of Niravu activities. Most of the women are homemakers in Niravu and they are actively involved in the organic farming and production of the product for the company. The relationship and collectivity among the women in Niravu are good and lively. The women are taking the role of resources persons of Niravu, they are going out for the classes and seminar which is organized by other organizers and they become expert in the organic farming and another initiative of Niravu. But even though the researcher observed that when the Niravu farmers producing company was started in the year 2016, there were 8 directors on the board but no female representation was there. And in the year 2018 the company reelected the board of directors and out of 9 one became female and the rest of the members are male. The presence and participation of the women are good but the representation of the women in the core administrative unit is less.

Informed Decisions

The decision making of Niravu is based on facts and information. Each initiative and decision is made after a detailed survey, discussions and with expert advice from CWRDM, KSSP, Kerala Agriculture University etc. The 'Jaivasree' project which is for the waste management and organic farming is stated after conducting a detailed survey about the households. The 'Urjasree' project which is started for energy conservation is started after taking detailed information about the household wise utilization of energy and each month they are keeping a record of the energy utilization. For each initiative Niravu is taking the expert advises of the respected institution. But at the same time researcher observed that Niravu did not conduct any soil test as part of the organic farming.

IV.Problems and Prospectus of the Experiment

Seeds – at the initial stage Niravu faced difficulties to get seeds especially the native seeds. Some of the elderly people among the residence gave some seeds and it was not sufficient. Niravu took the decision that they will not take any hybrid and genetically modified seeds. And the availability of seeds became really difficult. Niravu introduced their own way to collect the seeds. The seeds collection way was unique, the Niravu started collecting the seeds by collecting the seeds from where their girl's houses who married to the rural area and from the women's houses who married and come to Vengeri from a rural area. It was very successful and they have collected the seeds for farming.

Biofertilizer- at the initial stage getting biofertilizer like cow manure and other fertilizer was difficult in an urban area. So Niravu residence brought one Kasaragod native cow and planted biogas plant in Niravu residents. The cow is given to one household and everyone is using this cow manure for vegetable cultivation. Around 30 household has biogas plant and the residence are sharing the biogas manure each other for cultivation. At the initial stage, the use of biofertilizer did not give much productivity in vegetable cultivation because the soil was mixed with the chemical fertilizers. Even though after a period of time the productivity of the vegetable cultivation has increased.

Capital – at the initial stage of the Niravu, the capital for the project was collected from the members. At this juncture, a huge amount of capital was not needed. So the membership fees and some members took the money from their pocket. Later in 2016 for selling the product of the farmers producing company NABARD provided 5 lakh financial assistance for building a common platform to sell the products of farmers.

Marketing – at the initial stage, the marketing of the product was not difficult because at that time the production for the market was less. But when the news about Niravu started to appear in the newspaper and it helped a lot. And later the financial assistance from the NABARD helped to construct an outlet in the city. And in 2017 December 21 to 26 Niravu opened its 101 houses for an exhibition called 'Midori, which means green. The whole 101 houses were ready with all initiative of Niravu and that made Niravu more famous in the state and it helped the marketing.

V.Suggestions

Niravu should adopt new technologies like indoor hydroponic farming for continuous and sustainable farming. These type of new technology can be used for production throughout the year in any season. This will help Niravu to become more sustainable in food security.

The food production of Niravu should increase at a large level through modern technologies, so it will help the urban dwellers to access more locally grown fresh and quality food.

Niravu should conduct scientific studies to analyse the status and sustainability of the activities related to food security, nutrition level, change in the pollution level, soil assessment and the impact of organic farming.

Niravu should develop a new team with youngsters for the steadiness and sustainability of the initiative.

The Niravu farmers producing company and the Niravu organic village activities should go in hand in hand. For that, the Niravu need more concentrated work.

Water scarcity is a problem and urban farming is consuming a large level of water and to tackle this issue the new methods like water recycling and water reuse technology and other methods of rainwater harvesting need to introduce.

Conclusion.

Urban and Peri-Urban Agriculture is a growing trend in the world. The urban farming is an integral part of the urban system which producing food and producing jobs and income for the urban dwellers. Urban farming is playing an essential role in the conservation of urban ecology and resources. Even though urban agriculture is not getting enough attention from the side of the public and governments. Niravu organic village was an example for the urban agriculture initiative in Kerala which is in a starting stage. This initiative is one of the first examples in urban agriculture in Kerala and it started without seeing any previous examples, so the experiment has its own limitations and merits. This urban agriculture initiative can be seen as an attempt to be a sustainable urban village but even though the replicability of the experiment can be seen in a different way. Some of the initiative in the experiment can be a replicable model and some of the initiatives are not. The initiative can be seen as an effort of a group of people. The Collectivity and the relationship they are keeping is extraordinary. The initiative that they have taken to tackle the issues of waste management, water conservation, energy conservation and urban farming are appreciable. From a single urban organic farming, they have increased their area of work and involved in other areas also. But at the same time the urban organic farming was not sustainable and some of the technologies what they are using is not cost-effective and not enough to tackle the issues of water conservation, and more scientific inputs and training are still needed for the urban farming

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