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Promoting Agroecology

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LEIS INDIA



**Small farmers and
safe vegetable cultivation**



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Sani Manjhi, in Odisha, happily displays the
vegetables grown by her

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LEISA India is a member of the global AgriCultures
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Dear Readers

The World is evolving its own ways of coping with the crisis – a crisis which is unprecedented causing enormous disruption to all processes - health, social and economic well being of the human kind. The ever resilient farming communities and other enthusiasts are constantly creating new service ecosystems to deal with emerging challenges.

Vegetables have been an integral component of the farming system – for rural communities. Be it household kitchen gardens serving for balanced nutrition for farmer's family, healthy community exchange as well as potential markets. New urban hobbyists and enthusiasts are taking plunge into growing and consuming healthy foods. Vegetables have become a first choice for consumers interested in promoting and also being part of organic movements. It has also become a possible commodity to forge digital linkages between consumers and producers, especially in COVID times.

In such difficult times, we are very thankful to our authors and readers for strengthening Knowledge sharing and exchange. We, as LEISA India team, are extremely grateful to your spirited support.

We earnestly pray for the welfare of the farming communities who are relentlessly pursuing farming and all those who are helping them in the field – they too are COVID warriors. May God bless them!!!

The Editors

LEISA is about Low-External-Input and Sustainable Agriculture. It is about the technical and social options open to farmers who seek to improve productivity and income in an ecologically sound way. LEISA is about the optimal use of local resources and natural processes and, if necessary, the safe and efficient use of external inputs. It is about the empowerment of male and female farmers and the communities who seek to build their future on the bases of their own knowledge, skills, values, culture and institutions. LEISA is also about participatory methodologies to strengthen the capacity of farmers and other actors, to improve agriculture and adapt it to changing needs and conditions. LEISA seeks to combine indigenous and scientific knowledge and to influence policy formulation to create a conducive environment for its further development. LEISA is a concept, an approach and a political message.

AMEF is a member of AgriCultures Network, which is involved in co-creation and sharing of knowledge on family farming and agro ecology. The network is locally rooted and globally connected. Besides magazines, the network is involved in multi stake holders' engagement and policy advocacy for promotion of small holder family farming and agroecology. The network consists of members from Brazil, Ethiopia, India, Netherlands, Peru and Senegal. The secretariat of the network is located in IED Afrique, Dakar, Senegal.

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AME Foundation promotes sustainable livelihoods through combining indigenous knowledge and innovative technologies for Low-External-Input natural resource management. Towards this objective, AME Foundation works with small and marginal farmers in the Deccan Plateau region by generating farming alternatives, enriching the knowledge base, training, linking development agencies and sharing experience.

AMEF is working closely with interested groups of farmers in clusters of villages, to enable them to generate and adopt alternative farming practices. These locations with enhanced visibility are utilised as learning situations for practitioners and promoters of eco-farming systems, which includes NGOs and NGO networks. www.amefound.org

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5 Vegetable-based farming system *Enhancing gains through appropriate crop combinations*

Wajih S, Singh BK, Singh AK, and Srivastava A

Amidst the risk of recurrent floods and prolonged water logging with changing climate thresholds, 265 households of small and marginal farmers in eastern Uttar Pradesh and North western Bihar are setting new safe pathways towards developing flood-resilient vegetable farming. Adopting multi-layered farming technique, vegetable growers are harvesting two to three crops in the same piece of land simultaneously and have increased their net profit by more than double.



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A Anandakumar

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Rakesh K Warriar and Mahesh N Lade

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Urban spaces need to radically rethink their relationship with food in terms of production and consumption as climate change, land degradation due to industrialised farming present a serious challenge to food security. Community-based urban farming initiatives are proving to be an effective way to create sensitivity, critical awareness and connection with the land, farmers and ecosystems.



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Small farmers and safe vegetable cultivation

With growing awareness on health and healthy diets, vegetables have gained greater significance in the overall diet. Small farmers with limited resources, have been growing vegetables in their limited spaces or backyards. When primarily grown to fulfil household nutrition needs, vegetables are grown with care to produce safe and healthy produce, using organic inputs and by recycling resources. This encouraging trend is also quite evident in the urban spaces, where more and more city dwellers have taken up to safe vegetable production practices, be it on rooftops or balconies. In this issue, we bring some of the experiences of small farmers and urban initiatives that promote safe and healthy vegetable production.

Towards healthy vegetable production

If nutrition is important, it is imperative that vegetables need to be grown without using harmful chemicals. There is a need to shift to organic ways of producing vegetables. While farmers are interested to adopt the alternative options to agrochemicals, increased access to bio-inputs have great potential to minimize the conventional use of pesticides (Lakpa Sherpa and Ram Bahadur Rana, p.20). Similarly, vegetable farmers in Tumkur are reaping many benefits by shifting to ecological alternatives. They are also moving towards farm sustainability by diversifying crops and trees on the farms (Aanand Kumar, p.12).

‘Kutumba Kai Thottas’ or family kitchen gardens are being promoted by GREEN Foundation in Karnataka. Besides supplementing the nutrition, these family kitchen gardens are serving as a source for additional income to the families (p.10). Sustainable income generation is also possible by helping farmers add value to the produce. With changing lifestyles and growing preference for ready to cook food items, there is immense potential for processed food. Women farmers in Urulikanchan cluster tried solar drying technology to add value, with the support of BAIF (Warrier and Lade, p.25).

Small farmers are being innovative in making use of limited resources, especially land and water. Farmers

in flood prone eastern Uttar Pradesh and North western Bihar are following flood-resilient vegetable farming by adopting multi-layered farming technique. (Wajih S, et.al., p.5). Also, external agencies are providing innovative solutions to farmers in helping them get better returns. The Haryana Horticulture Department and SourceTrace digital platform collaborated bringing producers and buyers onto one common platform, enhancing the negotiation power of farmers resulting in better monetary returns (Venkat Maraju, p.34).

Covid 19 and urban initiatives

Community-based urban farming initiatives are proving to be an effective way to create sensitivity, critical awareness and connection with the land, farmers and ecosystems. (Deborah Dutta, p.30). Across the world, the concept of ‘grow your own food’ is gaining popularity, especially in cities and towns (Suresh Kanna, p.23). Vegetable cultivation has invaded the urban rooftops, free from the use of chemical fertilizers and pesticides, for a more organic diet. (GREEN Foundation, p.10)

COVID-19 has made us conscious about the quality and safety of our food. During the lockdown, a number of initiatives, though on a small scale were taken up to connect the farmers with the urban consumers. Few small and marginal farmers in Maharashtra joined hands with housing societies and farmer groups connected to the housing complexes, to sell fresh vegetables and fruits at the doorsteps of these societies. (Venkat Maraju, p.34). Similar initiatives in Mumbai brought the urban consumers and rural producers on to a common WhatsApp platform, which helped urban consumers empathise and appreciate the efforts put in by farmers.

Building immunity has gained much more importance than ever before. Farmers and citizens have tried a number of initiatives at growing safe food in kitchen gardens and rooftops. Besides keeping the environment clean, establishing urban gardens has increased access to safe, nutritious and fresh food.



Multi layered farming

Vegetable-based farming system

Enhancing gains through appropriate crop combinations

Wajih S, Singh BK, Singh AK, and Srivastava A

Amidst the risk of recurrent floods and prolonged water logging with changing climate thresholds, 265 households of small and marginal farmers in eastern Uttar Pradesh and North western Bihar are setting new safe pathways towards developing flood-resilient vegetable farming. Adopting multi-layered farming technique, vegetable growers are harvesting two to three crops in the same piece of land simultaneously and have increased their net profit by more than double.

The whole of the middle Ganga plain, which includes most parts of eastern Uttar Pradesh and western Bihar, despite being blessed by heavy rainfall (around 1200 mm), surface water from perennial rivers like Ganga, Ghaghara, Rapti and Gandak and fertile soil, mono-cropping farming activities have been dominant in the region with only one *Rabi* crop, being fully cultivated. The *Kharif* crop invariably suffers heavy damage due to recurrent floods or long durations of waterlogging in low-lying areas. Owing to large dependency on weather-based livelihood, mass existence of small and marginal farmers (more than 80 per cent), small and marginal landholding size (84 per cent below one hectare), the limited scope of mechanization in agriculture has forced these vulnerable people to represent poor human development indices. Besides, the changing climatic thresholds and intensifying hydro-meteorological disasters have exacerbated the vulnerabilities of the people in the region and forced people into a vicious cycle of poverty and indebtedness.

Considering the above-mentioned situations of the region, it has become important to address the issues of the small and marginal farmers to minimise the impact of crop damage and enhance the net profit by adopting innovative technologies. The percentage of small and medium farmers in our country is very high but due to the small size of their farms, are not being recognised as real contributors to the nation's economy, though providing livelihoods. In the campaign to make the country self-reliant, it has become important to understand the role of the small and marginal farmers in achieving the goal of

Box 1: Multi layered farming

Multi-layered farming maximises the use of land by adopting appropriate crop combinations with space (planting crops vertically, horizontally and underground) and time management (considering the duration of plant growth, maturity and fruiting). In the farming system, the first level is the underground surface, which promotes the production of tuber crops, the second strata is the ground surface on which various types of leafy and fruit vegetable are grown while the third level is the raised bamboo *machan*/ platform (generally 8 feet above the ground), where creeper vegetables are grown. This technique of farming increases the net sown area, reduces the input cost and more importantly enriches the fertility of the soil and adds organic nutrients to the soil.

Atmanirbhar Bharat and concerted efforts to be made to make this small farms more profitable and productive.

Prima facie, it seems a challenging task to achieve; however, these farmers have proven it by doing smart farm planning and by adopting appropriate crop combinations through the multi-layered farming system.

The technology

The multi-layered farming system is not a new technique of farming (See Box1). Farmers are practising it for a long time. But the improvisation in this technology made is the synergy of local knowledge of adopting appropriate crop (vegetable crops) combinations, its survivability in waterlogging condition and above all, the low risk of a complete crop failure.

The technology emphasises on space and time management. It focuses on smart farm planning and selection of appropriate crop combinations of vegetables with different root zones, maturity period, demand for solar energy (sunlight) and plant height.

This technique of farming is being piloted in Campierganj and Jungle Kaudia Block of Gorakhpur district and Nautan block of West Champaran, Bihar, under the Core Support Program supported by the Department of Science and Technology (DST), New Delhi. The inherent uniqueness and competitive advantages of the technology have not only paved a way for optimum land utilization but also opened up avenues for farmers to reduce input cost and increase the profit margin to an extent of more than double.

However, the vegetable-based multilayer farming is a labour-intensive technique, demands regular monitoring, smart planning at farm level as well as appropriate crop selection. If it is not done properly, it affects the production of crops and overall profit margins. Apart from this, it requires an additional cost of 25 thousands per acre on preparing bamboo-based *machan* /Platform etc., However, this is a one-time investment for the year and lasts for more than three to four years.

Initiative

The initiative of multi-layered farming with appropriate crop combination, on a pilot basis was started in 2019 over 3 acres of land in Gorakhpur and west Champaran. The research team had taken a comprehensive list of

locally grown vegetables and segregated three pairs (six crops) of crops combination of creepers, tuber and leafy vegetables. This segregation of crops was based on the parameter of pH level of the soil, property of root zone depth of the crops, availability and duration of solar energy (sunlight), nature/ property of crop, the tolerance level of crops to waterlogging and life cycle of the plants i.e time of sowing, transplanting, growth, and maturity of the crops.

Crop Combination trials

Three pairs of crop combinations are evolved of six crops. All these six crops are strategically selected based on time of sowing, duration of vegetative growth; time of harvesting and most importantly the demand for sunlight energy for growth.

1. Bitter gourd and Potato crop:

This is the combination of a creeper (bitter gourd) and tuber crop (Potato). Bitter gourd is a 6-months (August to February) crop while the potato is 4 months crop. Bitter gourd is planted in the month of August and its vegetative growth goes up to October. In November-December, as soon as the moisture in the atmosphere becomes less, the leaves of the bitter gourd start to fall and sufficient sunlight gets on the ground surface. This gives an opportunity to take another crop. Considering the nature of the life cycle of bitter gourd crop, potato is the only high demanding vegetable that can be taken with bitter gourd. So, farmer sows potatoes in October in the same field. It receives sufficient sunlight during November and December even under the *machan* of bitter gourd for its vegetative growth. Potato is harvested in February – March. In this way, using proper space and time management, farmer can harvest one additional crop and hence get an extra income.

For estimating the net profit of this combination with reference to solo cropping, three fields of one acre were selected. Two with solo crop (bitter gourd and potato separately) and one with the combination of both, using multi-layered farming. Producing bitter gourd and potato on two different farms of one acre

Table 1: Comparative Input-output cost, Profit in individual, and combination of Potato and Bitter gourd

Crop	Production (in quintal)/ acre	Input cost (in Rs)	Income (in Rs)	Net Gain (in Rs)
Bitter gourd	56.70	29,880.00	56,700.00	26,900.00
Potato	98.92	29,200.00	49,460.00	20,260.00
Bitter Gourd + Potato	122.60	38,380.00	82,475.00	44,095.00

Table 2: Comparative Input-output cost analysis of individual and combination of IVY gourd and Elephant Ear

Crop	Production (in quintal)/ acre	Input cost (in Rs)	Income (in Rs)	Net Gain (in Rs)
Elephant Ear	32.60	28,550.00	48,900.00	20,350.00
IVY Gourd	42.50	27,500.00	42,500.00	15,000.00
IVY gourd + Elephant ear	69.25	33,840.00	81,625.00	47,785.00

size, requires an input cost (collectively) of around Rs. 59,000. But, when both these crops are cultivated through multilayer farming technique, its production cost drastically reduces to Rs. 38,380. Thus, in the multi-layered farming system, the input cost for producing bitter gourd and potato collectively reduced by 35 percent and increases the profit differences by 25.89 and 45.51 percent, respectively, from the sole cropping. Thus, the input-output and net gain margins in this crop combination was much better in comparison to individual crops of bitter gourd and potato which is shown in Table 1.

2. IVY Gourd and Elephant Ear: IVY Gourd (local name ‘Kundru’) is a traditional creeper, grown in the area as a cash crop. The combination of cultivating elephant ear was successfully tried with IVY in one-acre area. As both these crops are taken during the Kharif season, while selecting this crop combination, the criteria of water tolerance and availability of sunlight for vegetative growth was prominently considered. IVY gourd is a water-tolerant crop, resistant even for 15-18 days of waterlogging while the elephant ear is a tuber crop, and does not require much sunlight. The crop calendar and input-output and profit margins of both these crops are given in Table 2. In this trial, the combination with an

Table 3: Comparative Input-output cost analysis of individual and combination of Bottle gourd and Cabbage

Crop	Production (in quintal)/ acre	Input cost (in Rs)	Income (in Rs)	Net Gain (in Rs)
Bottle Gourd	53.50	28,186.00	53,500.00	25,314.00
Cabbage	120.00	33,800.00	60,000.00	26,200.00
Bottle Gourd + cabbage	145.00	40,360.00	96,800.00	56,440.00

additional compatible crop enhances the profit and also compensates lowering of the yield of IVY gourd in case of damage of roots due to flooding. Elephant ear and IVY cultivation in combination increase the net gain difference by 75.9 and 92.5 per cent, respectively, when compared to sole cultivation.

- 3. Bottle gourd and Cabbage:** The third successful combination tried out was bottle gourd- a traditional creeper extensively grown in the area with cabbage, a leafy crop. As both the crops demand more sunlight for growth and fruiting, again while selecting these crops, the timing of sowing the crop and availability of sunlight are the important criteria. Bottle gourd crop is planted during June-July month and it takes two months (August and September)

Birbal, a small vegetable grower of Suras village of Campierganj block of Gorakhpur district. He primarily cultivates vegetables on his 0.18 acres of land. He grows sponge gourd, bitter gourd, beans, brinjal, ridge gourd and tomato. For the first time in 2020-21, he cultivated vegetables on his 0.18 acres of land with the multi-layered farming method. He cultivated beans on the surface and bitter gourd on Machan of his 0.18-acre field. He also planted sponge gourd on all four sides of the field. Thus, the total input cost incurred on seed, preparation of field and irrigation was around Rs. 5,870.00 coupled with Rs 4500 for making machan/ Platform with bamboo.

Despite lockdown from March to May 2020, Birbal said, "In last three months I sold beans of Rs 5,890.00 and bitter gourd of Rs 13,970.00". He earned a total of Rs 19,860.00 from both crops by investing 10,370.00. Thus, the net profit was Rs 9,490.00 (More than 91 % of the input cost). When Birbal's income was compared with another farmer Mr. Paekran, his neighbour, who cultivated bitter gourd only in his field of 0.18 acres with input cost of Rs 1150000 it was noticed that he got a better yield and sold bitter gourd of a total Rs. 16,000.00. However, when compared with a total net gain, Birbal got 52.37 per cent more profit than the Mr Paikaran with the same size of the plot area.

for its vegetative growth. However, in November- December due to decreasing moisture in the air, its leaves are shed. Hence, beneath the machan of bottle gourd, sufficient light gets available for the growth of cabbage crop. Farmers transplant the cabbage saplings in the field from the nursery at the end of November. Cabbage is harvested during December-January-February.

Therefore, the multi-layered farming technique helps in procuring yield of both the crops and increases profit per unit of land.

Impacts

The above appropriate crop combinations in multi-layered farming system helped in enhancing the profits of farmers. At the same time, they increased the spread of harvest time so that there is continued income for the farmer for a longer period. The advantages of the technology are:

- Per unit land area production is enhanced.
- Longer spread of market income.
- Soil moisture is protected with optimum use of soil nutrients.
- Higher Land Equivalent Ratio (LER).

As observed in various trials, the crop combination and multi-layered farming helped farmers in reducing input costs and increased profit due to factors like optimization of resources and reduced input needs (fertilizers, pesticides, irrigation, labour) and reduced losses due to floods/inundation. This provided better net gains and enhanced LER helping farmers in enhancing their income from farming. Based on the above-mentioned analysis, it is clear that vegetable-based flood resilient multi-layered farming technique is more profitable.

The benefits can be seen as follows:

- The farmers can take two or more crops in a single field simultaneously. Thus, provide higher profit in each combination which ranges between (115% to 147%) from the same piece of land.
- The need for both crops is fulfilled in the same irrigation, manure, weeding and hoeing. This reduces

extra input cost by 33 percent on an average, thereby, increasing the profit margin.

- With the inclusion of diversity in multi-layered farming, the quality and nutrition content in the soil improves. Also, having many crops in the same field during a time, it reduces the chance of getting impacted by diseases and infection.

Conclusion

The technology is most appropriate to all the small and marginal farmers of Indo-Gangetic Brahmaputra plains who have limited scope for farm mechanisation. Initially, the technique was started and tested in a small segment with 9 model farmers of village Jungle Kaudia in block Campierganj of Gorakhpur, UP and Nautan block of West Champaran Bihar, with six vegetable combinations. In two years, it has scaled up to 265 households in Gorakhpur and West Champaran. Now farmers are experimenting more combinations and innovating on their farms to extend their profit and minimise their losses incurred due to flood and waterlogging.

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Call for Articles

Local Produce, Local Markets and Local Economies

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Small holder Family Farming communities have been traditionally tapping the local markets for their convenience as well as ease of reaching out. The farming communities do prefer local varieties (crops and livestock) as they are suitable and resilient to the local contexts and climate aberrations. With increasing demand for local foods, cuisine and the interest in traditional biodiversity is getting revived. However, always there are market driven choices taken up by venturesome farming communities with their associated known and unknown risks and challenges as seen during this pandemic time.

The year 2020 has been a year of unprecedented challenge for all sectors of economy. However, the ever resilient farming communities have taken up the challenge and relentlessly pursued farming and ensured growth. The year 2021 has been declared as International

Year of Creative Economy for Sustainable Development. It recognises the need for an enabling environment in creating full and productive employment and decent work, supporting entrepreneurship, creativity and innovation.

We look forward to know how farmers have tackled all odds in focusing on creatively dealing with pursuing local produce, tapped local markets, also the distant markets through digital outreach and keeping the local economies sustainable. Also, it would be interesting to understand how the farming communities created full and productive employment in the times of labour migration, creating new enterprises and social inclusion while tackling poverty.

Please send your articles to The Editor at leisaindia@yahoo.co.in before 20th October 2020.

Kutumba Kai Thottas

GREEN Foundation

'Kutumba Kai Thottas' or family kitchen gardens are being successfully promoted in Karnataka, to supplement the nutritional intake of these families and provide a source for additional income.

With growing awareness about the quality and safety of our food, vegetables have received increased consumer attention for its freshness, hygiene and nutrition. Besides small farmers in rural areas, entrepreneurs and hobbyists alike have taken to vegetable farming. Vegetable cultivation has invaded the backyards and urban rooftops of those who prefer to grow their vegetables themselves, free from the use of chemical fertilizers and pesticides, for a more organic diet.

GREEN Foundation, an NGO works with the farmers in Kanakapura taluk in Karnataka. Majority of the farmers own one to two hectares of land and adopt monocropping practices. Farmers depend on rainfed agriculture and earn on an average, Rs.30000 annually. In the off season, they migrate to nearby villages or other states for work including agricultural labour and other kinds of manual labour.

As a part of their association, GREEN Foundation has been conducting clinical service camps and health check-ups in collaboration with the local Primary Health Centres, thereby monitoring the health of people. Several diseases related to nutritional deficiencies were identified

during these camps. The families, on an average, spent around Rs 400 every month to buy vegetables. Considering the unpredictability of agriculture and the meagre incomes they earn from it, supplementing their diet with vegetables was difficult, thereby compromising on the nutritional security of the households.

Based on the situation, GREEN Foundation, encouraged and supported farm families to grow 'Kutumba Kai Thottas' or kitchen gardens to supplement the nutritional intake of these families and provide a source for additional income.

Building capacities

The field staff identified farm families with space for growing vegetables in their backyards and convinced the women of the families of the benefits of a kitchen garden - both nutritional and economic. Women have always taken the lead in vegetable cultivation and saving seeds. The women are trained in growing these vegetables organically in their backyards. Native seeds are promoted and the farmers are educated about the importance of these native seeds which are disease and pest resistant.

The staff assess the landscape and recommend different methods such as raised bed method, permaculture and check basin method. Farmers are offered 22 options of vegetable seeds to choose from and the staff support them by recommending seeds fit for their specific contexts, taking into account space, soil, likelihood of pest attack and overall interest. Some farmers grow as many as 10 different vegetables in their kitchen gardens. For the last

Kitchen gardens are not only a source of nutrition, but a source of quick income as well.



Kitchen gardens provide access to a variety of vegetables

couple of years, women farmers have been leading this activity and growing chillies, coriander, spinach, carrot, beans, radish, tomato, cucumber, bottle gourd, ridge gourd and bitter gourd in their kitchen gardens. However, considering the health profile of the population, we have been insisting on crops like drumsticks and curry leaves, among other vegetables, due to their specific nutritional characteristics that can prevent diseases such as anaemia, diabetes, hypertension, etc.

Farmers are trained in preparing bio-inputs as well, thereby reducing their dependence on expensive inorganic inputs. The bio-inputs prepared include farmyard manure, drava jeevamrutha, poochimarandu, panchagavya, chilli-garlic decoction, lemon kashaya, ghana jeevamrutha, etc. The bio-inputs are also procured directly from the Janadhanya Farmer Producer Company Limited (JFPCL), which was established as an association of farming community members who are empowered to work collectively to conserve agrobiodiversity, provide market linkage for farmer produce and promote organic farming, among other objectives.

Interested farmers are also trained in producing surplus seeds which are sold to JFPCL after ensuring there is enough for the next cultivation cycle. This acts as a source of extra income for the farmers.

GREEN Foundation has been supporting around 160 farm families from different villages in the Kanakapura taluk of Ramanagara district to grow kitchen gardens.

Benefits

Growing kitchen gardens in available spaces around their homes using organically available resources, has helped offset the additional cost and satisfy families' nutritional requirements. Chillies, coriander, spinach, carrot, beans, radish, tomato, amaranthus, okra, cucumber, bottle

Thaimudamma is a marginal farmer who belongs to a family of four. The backyard of her house in Marasarahalli was empty before she began to grow a kitchen garden. She was given training on how to manage a kitchen garden and the types of vegetables she can possibly grow. Today, she grows 15 kinds of vegetables in a 2.2 cent plot using the permaculture method. Janadhanya provided her access to bio-inputs such as panchagavya, vermiwash, agniasthira and pongamia powder. She harvested around 9 kg of local brinjal, 8kg ridge gourd, 6 kg bottle gourd, 13 kg pumpkin, 25 kgs okra, 40 kg tomato and 12 kg of chillies. She distributed the surplus among her neighbours and relatives. Thaimudamma was also trained to produce surplus seeds.

gourd, ridge gourd and bitter gourd are some of the vegetables grown in their kitchen gardens.

The produce per household varies largely depending on the size of the plots, but on an average, a household produces between 100 and 200 kg per year. Although the produce is primarily for consumption within the family, some surplus is distributed among neighbours and relatives and the remaining is marketed through the JFPCL or through the local market. Kitchen gardens are therefore not only a source of nutrition, but a source of quick income as well. In addition, they are able to save Rs 400 every month, which they were spending earlier on buying vegetables.

Besides the nutritional aspect, vegetable cultivation is popular as a source of quick income for poor households. Vegetables require a shorter duration for cultivation than cereal and fruit crops and are less input intensive, hence helping farmers engage in Low External Input Sustainable Agriculture (LEISA). Farmers use bio-inputs instead of inorganic alternatives which are expensive. Their indigenous knowledge comes in handy in preparation and use of such products.

There are more people waiting to put their own empty spaces around the house to good use and secure the nutritional requirements of their families. Around 380 farmers have applied at their gram panchayats for a State Government scheme promoting kitchen gardens, where the beneficiary will be given a package of Rs 2750, including the seeds.

GREEN Foundation

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Organic vegetable cultivation

A Anandakumar

Vegetable farmers in Tumkur are reaping many benefits by shifting to ecological alternatives. They are also improving farm sustainability by diversifying crops and trees on the farms.

Urdigere and Kolala hobli of Tumkur and Koratagere taluk of Tumkur district is traditionally known for vegetable production. About 76 percent of the farming community belongs to small and marginal category with land holding ranging from one acre to two acres. Several farmers depend on vegetable cultivation for their livelihoods.

Majority of the farmers grow vegetables as a commercial crop. They generally grow crops such as tomato, beans, brinjal, ladyfinger, potato, chillies, cauli flower and leafy vegetables. As farmers grow for markets, the cultivation is intensive involving high usage of chemical fertilizers, pesticides and weedicides, resulting in higher production costs. Farmers are not aware of organic practices and do not follow any resource conservation techniques like soil and water conservation. Also, they lack timely guidance

Sri Charan's organic tomato farm in Anupanahalli





Farmers meet every month to discuss about organic farming issues

on improved practices and there is no platform for exchange of knowledge and learnings from each other.

Avishkar, a development organization has been working in this area since 2011. Focus of its activities has been on women empowerment, village level institutions and agriculture development activities. Avishkar has promoted around 157 SHGs and 20 Farmer Clubs in Tumkur and Koratagere taluks.

In 2017, Avishkar with the support of Save Indian Farmers, USA, promoted SIF-Organic farming project to encourage organic farming practices in the region. It supported 15 farmers during 2017-18 and 17 farmers during 2018-19 through various activities.

Two to three farmers from each village, interested in organic farming, were selected during the village meetings. Baseline data of these farmers was collected. Farmers were trained on organic farming practices. Exposure visits were arranged to successful organic farms. Farmers visited Shri Narayanareddy farm, Doddaballapura and Shri Kodipapanna farm, Hunsur Mysore district and BAIF, Tiptur.

Demonstrations were organized for promoting various organic practices, like vermicomposting and tree based

Farmers' fields are rich in earthworm population owing to application of vermicompost.

farming systems. Initially, demonstrations on organic farming were taken up in 10 to 15 guntas, growing vegetables such as beans, brinjal, tomato and leafy vegetables. Use of enriched compost, application of jeevamrutha, Vermi wash, neem cake, and drenching of AMC (Arka Microbial Consortium), trichoderma, neem soap, neem oil and dasaparni were promoted. Hands on training was organized for preparation of jeevamrutha, dasaparni and enriched compost.

A number of innovative technologies related to organic farming were also suggested to the farmers during the monthly meetings in the respective villages. KVK, Hirehalli and other horticulture experts provided the technical support.

Farmers got support to establish vermicomposting unit, drums for preparation of plant based pesticides, solar traps, exposure and training. Farmers were also provided with 40- 50 fruit plants and 70-80 forestry plants per acre. Fodder species like sesbania and hemata were promoted all along the field bunds. Fruit trees and forestry species were planted all along the farm bunds and on the cropping land. Multiple cropping and crop rotations were also adopted in the cropping lands of the participants.

Results

Each farmer has cultivated vegetables in one acre each. Farmers have grown brinjal, ridge gourd, bitter gourd, tomato and beans.

Farmers have realized the importance of soil fertility enhancement through application of enriched compost, liquid fertilizer (Jeevamrutha), green manuring and vermicompost. They have adopted seed production, seed treatment, vermicompost, application of Jeevamrutha, mulching and organic vegetable cultivation practices promptly.

Five farmers are producing vermi-compost manure. Farmers' fields are rich in earthworm population owing to application of vermicompost.

Green manuring with seeds of horse gram, cowpea and application of neem cake and Jeevamrutha is being practiced by all the project farmers. This has helped to improve the soil fertility and soil organic carbon.

Cultivation Practices	Technology adoption by the farmers
Soil and moisture conservation	Soil and water management practices
Tree based farming	Farmers slowly understood importance of tree based farming, they are planting mixed forestry trees and horticulture plants
Seed treatment	Treated with Arka microbial consortium (AMC), Trichoderma Viride and Beejamrutha.
Sowing and planting	Used young seedlings, provided wide spacing, mechanical control of weeds
Soil fertility enhancement	Vermicompost manure, Farm Yard Manure (FYM), enriched compost, neem cake, Jeevamrutha, bio-fertilizers and organic manures
Pest and diseases management	Use of bio-control agents and bio-pesticides

Farmers express that the soil quality has improved. Shri Venkatesh from Alumardapalya village shared that the quality of soil has improved- soil has become soft and there is better water holding capacity.

Farmers gained knowledge in different mixed cropping systems instead of mono cropping. Crop rotation is in practice in the project area. Eco friendly production practices through IPM and INM practices were adopted, which have helped in reducing the production cost. Shifting to ecological alternatives has resulted in reduced application of chemical fertilizers, thereby reducing the amount of nitrates released into the atmosphere- one of the GHG responsible for global warming.

The sustainability of present agriculture system was enhanced through integration of tree component- called tree based farming system. Forestry species, fruit species and fodder cultivation have increased the plant diversity of the selected farmers. They will serve demonstrations for other farmers in the coming days.

Pruthvi organic forum has been formed. Farmers meet once a month and discuss about organic farming issues in the meetings. KVK scientists, progressive organic farmers and agriculture department staff are also invited for the meetings. Presently, there are plans to convert this forum into Organic Farmers Producer Company, the registration of which is under process. The FPO

Chikkanagaiah is a small farmer living in Durgadahalli village in Tumkur district. He has two acres. He grows vegetables and other crops. Since his land is rainfed, he was not getting much yield because of frequent droughts. The bore well in his land was not supplying water to the entire field since the groundwater level had gone down in the recent years.

Chikkanagaiah participated in the training and exposure visit actively organized by AVISHKAR under SIF-organic farming project. He has cultivated leafy vegetables, beans, tomato and chilly and other creepers for home consumption. He also grew beans, tomato and brinjal, following organic practices, for the market. He sells his vegetables in Farmers organic vegetable market in Tumkur every Sunday. On an average, the family earns Rs.25000/- to Rs.30000/- net profit per year. "Every week, I earn Rs. 1000," says Chikkanagaiah happily.

He planted 60 lemon, 30 Moringa and 50 Meliadubia plants on his farm. All the plants have survived with good growth. He was motivated and purchased another 50 lemon plants on his own and planted at distance of 15 feet each. Presently, plenty of fodder is available from the Sesbania fodder plants and providing fodder for livestock. In order to make better use of Sesbania fodder in his land, he has purchased two goats. His wife, who was earlier working as a daily wage laborer in nearby villages has now given up the job and is involved in agriculture as a full time farm woman.

will ensure better marketing, as presently the produce is being sold in Tumkur organic outlets and selling at Farmers organic vegetable market in Tumkuru every Sunday. There are also plans to open an organic outlet at Tumkur to facilitate the sale of organic vegetables and other produce.

Though there are instances of crop loss due to organic methods with few farmers, the interest of the farmers has been maintained at high level through continuous personal interactions, motivation and guidance from agriculture institutions. In a period of 4-5 years, dry lands under the project villages will become diversified farms with increased food security, fodder availability and resilience to impacts of climate change.

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Producing vegetables locally

Usha S, Manju M Nair and Devika A S



Saji Kumari is a PGS certified farmer supplying vegetables to organic bazaar

In the times of Covid pandemic, building immunity has gained much more importance than ever before. Farmers and citizens in Kerala have tried a number of initiatives at growing safe food in kitchen gardens and rooftops too increasing their access to healthy and nutritious food.

Kerala is a fast urbanizing consumer state in the last 2-3 decades. In the last 10-15 years many groups including our organization Thanal has been trying to promote organic vegetable cultivation in Kerala. It did bring some change among urbanites and many health-conscious people to produce at least part of the vegetables for their own needs in their kitchen gardens and even on roof-tops. Many of them started to share and sell their produce with neighbours and weekly markets set up by like-minded people.

Covid 19 - a game changer

Covid 19 pandemic and lock down in a sense became a game changer. In order to be prepared in the face of uncertainties such as the lockdown, Kerala Chief Minister, Pinarayi Vijayan, made a call for 'food self-sufficiency' through local food production, especially vegetables and tubers. Director of Agriculture Dr K. Vasuki also pushed for a movement where food is grown at home, encouraging local farms and young volunteers. In the last three months, State started an Integrated Food Security project that encouraged

farming in homes and also reviving fallow lands. This essentially meant farming vegetables for individual consumption and maintaining livestock for one's own use. Media, especially social media played a good part in encouraging people to start vegetable gardening and agriculture department started to supply vegetable seeds as well. Many groups working with farmers also started to distribute seeds locally. Though not natural farming, these plants are tended to with much care – the fertilisers (dried dung manure mainly) and pesticides (a concoction of herbs, neem oil, kanthari chilly, garlic and soap) are largely used. The produce was shared with neighbours also during the lockdown, and continues to be popular even as lockdown eases. People even started to plant chinese potato, colocasia, tapioca, elephant foot yam etc., in small plots in their back yard.

Fallow lands to food lands

As an organisation working with farmers for the last two decades, Thanal launched a programme called Project Food Scape in April. The project aimed at converting fallow land in rural areas to food land. The idea was to

raise funds from people and give back the money as food materials when farmers harvested the crop.

Farmers and rural youth were supported by providing inputs like seeds and bio manures, training and handholding to manage pest and diseases using agroecological techniques and practices. In the last two months we have supported around 800 farmers by providing these inputs as well as by giving training on organic management of soil, pests and diseases. This included tribal communities in two districts, Attappady in Palakkad and Naranamoozhi in Pathanamthitta, where food production had come down drastically in the last 20-30 years due to various reasons.

We have been working in 19 villages in Attappady since 2019 on 'Nutrition sufficiency through agroecology' in collaboration with Scheduled Tribes Development Department. This pilot project aimed to revive their traditional agriculture called Panchakrishi and also revive their millet based food system. There was great enthusiasm among the elders, both men and women when we began. Many educated youngsters without a proper livelihood, got engaged in this project. Few of them got together and started to understand more about panchakrishi as well as the new Agroecology concept. They launched a pilot project to conserve the indigenous seeds and practices with the help of elders in their community. And they named it '*Vedhe Valle*' meaning seed basket.

Once they heard about Community Managed Natural Farming in Andhra Pradesh, through our interaction, they wanted to try out. Many farmers offered their support to experiment. Suddenly everything got stuck due to Covid 19. During the first lock down we had intense interaction with the core team members. Once the total lock down was lifted, we launched Project Food Scape to support these youngsters and old farmers, who realised the importance of developing indigenous food and farming. They had all the enthusiasm and human resource, but lacked financial resources. They wanted Rs 5,000 per acre as an advance. Through the project Food scape, Thanal raised this money. Many friends and consumers came forward to put resources. Our offer was to return the money as food grains, pulses and vegetables. It was heartening to see that many people did not want anything in return.

Beginning of organic vegetable cultivation by Thanal

We began working with farmers in the year 2001 in two panchayaths in Trivandrum district. This was a pilot project on organic farming with women farmers near Kovalam. Kerala was going through an intense debate on pesticides generally and Endosulfan specifically in which Thanal played a key role in bringing information about the pesticide. This project was to show that it is possible to do farming without chemical pesticides. Discussion on food production and becoming self-sufficient in food always was critiqued by many including scientists and the main argument was Kerala's small land holding size is a problem to achieve this. This was seen as a limiting factor and one of the objectives of our project was to show how much can be produced from small holdings and how small holders can get in to sufficient vegetable production. Kerala has good climate and soil which is suitable for fruits and vegetable cultivation. We started with 3 self help groups of women who did not own much land. In an year's time they showed great success and the panchayath invited us to help them in planning for organic vegetable and banana production. Later this helped Thanal in working with the state government to develop organic farming policy for the state.

Farmers have started to plough the land, sow seeds and our youth team is coordinating this project. They themselves have taken some land on lease and started organic vegetable production along with supporting other farmers. We conducted online training for the youth team on natural farming and agroecology, especially on pest and disease management and preparation of bio manures in 6 sessions. We also encouraged them to attend online courses on natural farming conducted by other organisations as well.

Another tribal community in Pathanamthitta district were not able to move out for work and there wasn't much work available owing to Covid. Around 480 people were supported with 13 different kinds of vegetable seeds, bio inputs and a guideline about how to do organic vegetable cultivation. Because of heavy rains many of them could not start the work. Meanwhile, we are planning a training programme for selected people from this group.

Community kitchens

Having understood the value of local food production, all the panchayaths in Kerala started community kitchens during the lock down. We started to work with Karakulam panchayath in Trivandrum, which is close to the city but still has lots of small and marginal farmers. The panchayath was very enthusiastic to associate with us.

Around 130 farmers, many of them women, were supported with a farming kit containing different varieties of vegetable seeds and bio inputs to start the soil improvement. Two trainings were given to some selected farmers on organic vegetable cultivation. With the restrictions on movement by the government in the last month owing to Covid, it became difficult to reach out directly to all the farmers who had registered and taken the seeds from us. But they have started cultivation and we plan to run a mobile organic agro clinic service in this panchayath.

My Food Garden Challenge

The pandemic was causing a lot of confusion among our team and also among the farmers closely associated with us because they were not able to move out, finish some of the work, meet farmers, document etc. to engage them and make use of their expertise in organic farming, we launched 'My Food Garden Challenge' to get all of them into serious farming. We formed a WhatsApp group and shared pictures of farming and issues in handling some pests, soil management, space problem etc. It became so interesting and meaningful that every body had stories of success and hope to share. Here are a couple of examples.

"My stint with organic vegetable gardening started when I joined Thanal 12 years back. Last year, I shifted to a new locality and there too, I started growing vegetables on the roof top. I shared the growbags and seeds which I received from Thanal with a few of my neighbours to encourage them into growing vegetables. I grow ladies finger, chillies, brinjal, bottle gourd etc. We now share seeds, saplings and harvest and have become a closer community. Having experience in farming earlier and with advice from Arun, Programme Officer at Thanal, I am able to give them tips on bio pest control and bio manures. As the next step, I am thinking of expanding our farming circle by arranging a training class by Thanal mobile agri clinic team in our community. I am waiting for this pandemic situation to change so that we add more people to our farming community and become self-sufficient" says Pramila from Vellar village near Kovalam.

Deepak, the Manager at Organic Bazaar says *"Seven of us have leased 1.5 acres of land from an organic farmer friend and have started this venture called 'Venad*

Organic Farms'. The main crops are banana, ginger, turmeric, yam, taro, sweet potatoes, vegetables like tomato, chilli, brinjal, bitter gourd, ivy gourd, pumpkin and ash gourd. We are trying to attain self sufficiency without incurring any cost on inputs which means that we do the entire farm work ourselves, we grow saplings from in-house seeds, make our own bio manures, bio pest repellants and potting soil, rear fishes in the pond and this water when changed becomes the manure for plants and use water from the canal across the plot for watering. Intercropping pattern is followed by planting yam and taro between banana plants along with brinjal and cucumber. Turmeric and ginger are planted interspersed keeping in mind their pest control properties. Having realised the importance of mulching, we use jute sacks and dry leaves. Our focus is to grow bananas and those vegetables which are scarce in Organic Bazaar. We have also started selling our potting mixture which has helped us recover a part of cost incurred. All of us make it a point to work for atleast 3 hours daily morning in the plot. Though all of us have been active in farming for many years, working with nature on early morning gives us a big adrenalin rush and keeps us active and smart for the whole day. Our health and energy levels have also vastly improved".

This is a welcome trend in Kerala because building immunity has become an important health concern among people. Consuming nutritious food, especially fruits and vegetables is very important for leading a healthy life. Kerala's topography and soils are suitable for fruits and vegetable cultivation. Agriculture department has identified around 1 lakh hectares of fallow land which can be put to food production in the state. It is interesting and hopeful to see many educated young people talking about 'my food my responsibility'.

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India's first 'Kisan Rail' flagged off from Maharashtra's Deolali to Bihar's Danapur

The country's first ever weekly 'Kisan Rail' was flagged off on Friday from Maharashtra's Deolali to Bihar's Danapur to help farmers send their perishable agro products to inter-state markets without any delay. Shri. Narendra Singh Tomar, Union Minister of Agriculture and Farmer Welfare Minister, flagged off the train virtually in the presence of railways minister Piyush Goyal and others. Goyal, tweeted, "This is the beginning of a major change in the lives of the farmers and consumers of the country".

The announcement of this train for farmers cultivating vegetables and fruits was made in the rail budget this year. Chief spokesperson of East Central Railway (ECR), headquartered at Hajipur in Bihar, Rajesh Kumar said the 'Kisan Rail' will provide seamless connectivity among farmers, markets and consumers. "All the required measures have been taken to safely transport perishable vegetables and fruits," he said. He said the train has 11 specially built parcel coaches equipped with fridges to serve as cold storage on the go.

The 'Kisan Rail' will depart from Deolali in Nashik at 11 am every Friday and reach Danapur at 6.45 pm the next day. The train will halt en route at Nashik Road, Manmad, Jalgaon, Bhusaval, Burhanpur, Khandwa, Itarsi, Jabalpur, Satna, Katni, Manikpur, Prayagraj Chheoki, Pandit Deen Dayal Upadhyay junction and Buxar stations. On its return journey, the train will depart from Danapur at 12 noon every Sunday and reach Deolali at 7.45 pm the next day.

"Earlier, these were moved in trucks to other states but now the farmers can book bogies according to their needs with zero risk of damages to crops and agro products," Kumar said.

From the Maharashtra side, onions, grapes and other perishable fruits will get markets elsewhere and from the Bihar side, makhana, fish and vegetables would be transported to big markets outside.

Source: <https://www.newindianexpress.com/nation/2020/aug/07/indias-first-kisan-rail-flagged-off-from-maharashtras-deolali-to-bihars-danapur-2180389.html>

SBI links YONO Krishi with govt portal for delivery of horticulture seeds at farmers' doorsteps

New Delhi, Aug 28 (PTI): The country's largest lender SBI on Friday said it has integrated YONO Krishi platform with government's first online horticulture seed portal to facilitate delivery of high quality seeds at farmers' doorsteps.

YONO Krishi integrates with ICAR IIHR seed portal to reach out to 2.7 crore customers registered on YONO, SBI said in a release. The Indian Council of Agriculture Research (ICAR) has been bringing new innovations in agriculture through research and development since last 91 years.

Indian Institute of Horticulture Research (IIHR) team has brought out a digital portal for farmers to purchase

seeds of high yielding and disease resistant varieties, it said. Farmers across the country can shop for IIHR variety of seeds suitable for different climatic zones and geographical areas, SBI said. It will empower farmer customers to purchase the high yield, high quality seeds being sold by the research institute.

The integration was launched by Agriculture Minister Shri. Narendra Singh Tomar in presence of SBI Chairman Rajnish Kumar earlier on Wednesday (August 26), the lender said. "Wherever technology has been used, it has helped the rural areas significantly, in which banks have made significant contribution over the years. State Bank of India, being the largest bank, has played a pivotal role all along," Tomar said.

With this integration of ICAR-IIHR with YONO Krishi, farmers will be able to purchase seeds certified by the research institute, the minister said. He said the entire amount of government schemes is reaching directly to beneficiaries due to transparency and SBI has contributed in implementation of government initiatives like PM-Kisan, Prime Minister Jan Dhan Yojana as well as transparent payments to the identified beneficiaries of the subsidies.

SBI's one-stop YONO (you only need one) digital platform which was launched about two-and-a-half years

ago has seen more than 56 million downloads with over 27 million registered users. YONO has partnered with over 80 e-commerce players in more than 20 categories and has also forayed into global markets such as the UK and Mauritius. PTI KPM MKJ

Source: <https://www.outlookindia.com/newscroll/sbi-links-yono-krishi-with-govt-portal-for-delivery-of-horticulture-seeds-at-farmers-doorsteps/1924791>

Agriculture clocks growth rate of 3.4% in Q1 despite GDP contraction

Agriculture and allied activities were the sole bright spot amid the dismal GDP performance of other sectors, clocking a growth rate of 3.4 per cent at constant prices in the first quarter of 2020-21.

Farm sector growth in the first quarter of 2019-20 was 3 per cent at constant prices. However, the growth, driven largely by a bumper rabi harvest and facilitated by relaxation in lockdown, may not have resulted in a big rise in income for a section of farmers. Evidence for this is Gross Value Added (GVA) at current prices for agriculture and allied sectors rising 5.7 per cent in Q1 of 2020-21 against 8.6 per cent in the same quarter last year. This translates into an agricultural inflation rate of 2.3 per cent in Q1 2020-21, down from 5.6 per cent in the first quarter of last financial year.

This was among the lowest increases in inflation in agriculture items in more than a year. Inflation, which is sometimes used as proxy for farmers' income, was down, according to some experts, largely due to a dip in prices of items in allied sectors, which include horticulture, livestock, fisheries, and dairy.

Though prices of core crops remained largely steady during the lockdown months of April to June, mainly due to strong government procurement, prices of horticulture produce, namely vegetables, and livestock items such as eggs, meat, and milk dropped sharply at the producers' level due to disruption in supplies from mandis to consumers and unfounded rumours about

the virus spreading to protein food. Perhaps this was a reason why there was a divergence between wholesale prices and consumer prices in the lockdown months and in July, after the restrictions were relaxed.

India's rabi production in the 2019-20 crop year (July to June) is estimated to be around 149.60 million tonnes, 4.10 per cent more than the previous year. Of that, wheat output is estimated at a record 106.21 million tonnes, which is 2.51 per cent more than last year. This is according to the last available official estimates.

"The sole positive in the economy is agriculture, which is a slight surprise because we all were expecting public administration, defence etc also to show positive growth, but that too turned negative," said Madan Sabnavis, chief economist, CARE Ratings. He said good growth in agriculture and allied activities was largely due to the bumper rabi harvest, mainly wheat. Sabnavis said the agriculture sector would show positive growth momentum in the second quarter too, mainly on account of a good kharif harvest (a portion of which will start hitting the market in September, before the second-quarter numbers are out) and also due to good growth in allied activities.

Source: https://www.business-standard.com/article/economy-policy/agriculture-clocks-growth-rate-of-3-4-in-q1-despite-gdp-contraction-120090100046_1.html



Farmer participants in a training event doing preference ranking exercise

Eco alternatives for small-holder farmers

Lakpa Sherpa and Ram Bahadur Rana

Farmers are interested to adopt the alternative options to agrochemicals. Adoption of disease resistant varieties and availability of bio-pesticides have great potential to minimize the conventional use of pesticides. The pilot initiative of LIBIRD in Nepal shows this.

There is an increasing trend of agrochemical use in Nepal. With increased food demand, especially for vegetables and animal products by urban consumers, intensive cultivation practices are being adopted. Therefore, the use of chemical fertilizer and pesticides are more prevalent in commercial vegetable production areas in Nepal.

Panchkhal Municipality in the Kavreplanchowk district is around 50 km east from the capital city, Kathmandu. This place is an important source of green seasonal and off-seasonal vegetables and potato for Dulikhel, Kathmandu and Lalitpur. Local Initiatives for Biodiversity, Research and Development (LI-BIRD) carried out a study in Panchkhal Municipality area to understand the prevalent

production practices in vegetables. Around 140 farmers were randomly selected for the study. The study reported that the use of agrochemicals is widely prevalent in vegetable production (72%) and potato (96.4%). This was primarily for insect pest and disease management. Farmers have limited awareness on recommended dose of pesticide (56.4%), mode of action of pesticides (22%), and IPM practices (42%). Incidence of pesticide poisoning was also reported by 13% respondents. The study findings encouraged LI-BIRD to focus its attention to reducing knowledge gap on agrochemical use as well as to provide alternative options to agrochemical use.

Reducing knowledge gap in agrochemical use

During 2018-19, a series of field level training events were organized with 316 farmers for a year. Training was focused on the crop specific and seasonal vegetable disease and pest issues. In each training event, a maximum of 25 participants were invited for effective participatory discussion and interaction. Farmers were requested to bring the live specimens of disease and insect or any other abnormalities. These specimens were observed, identified and control measures suggested during the training sessions. Farmers were also introduced to the bio-pesticides available in the market for treatment of the plant diseases.

The trainings were supplemented by continuous follow up, farm visits and technical inputs by field staff which helped to increase the awareness levels of farmers. Mr. Bhakta Bahadur Danuwar of Panchkhal Municipality-ward 4, who uses a yellow sticker in his cucumber field says - *'I do not wish to poison my soil, and my health, if I have simple and alternative options to grow healthy vegetables'*. There are other farmers like Mr. Bhakta Bahadur who now read pesticide label, purchase yellow sticker, pheromone traps and other easily available IPM tools to manage the diseases and pests.

Access to bio inputs and cultivation of disease and pest tolerant varieties lead to lesser use of agrochemicals.

Identification of disease tolerant/resistant potato varieties

Diversity in variety and large-scale cultivation of disease and pest tolerant varieties have the potential to reduce the application of agrochemicals on crops, thus providing the most effective and cost-efficient means to reduce environmental and health hazards.

Potato is one of the major crops in Panchkhal area, where *Janakdev* potato variety is cultivated on a large area, with limited varietal diversity. This principal crop receives maximum amount of fertilizers and pesticides. Soon after preliminary analysis of potato cultivation status, LI-BIRD in 2018 conducted on-farm varietal trials to identify promising potato varieties that are tolerant to potato disease (late blight), high yielding and preferred by farmers through on-farm testing and participatory evaluation. Six potato varieties (*Janakdev*, *Kufri Sinduri*, *Khumal Rato*, *Axona*, *Khumal Bikas*, and *local*) were tested in four replicated trials (farmer as replication). Based on farmers' evaluation, *Axona* and *Khumal Bikas* were preferred by farmers for their higher yield, disease tolerance, and attractive tubers.

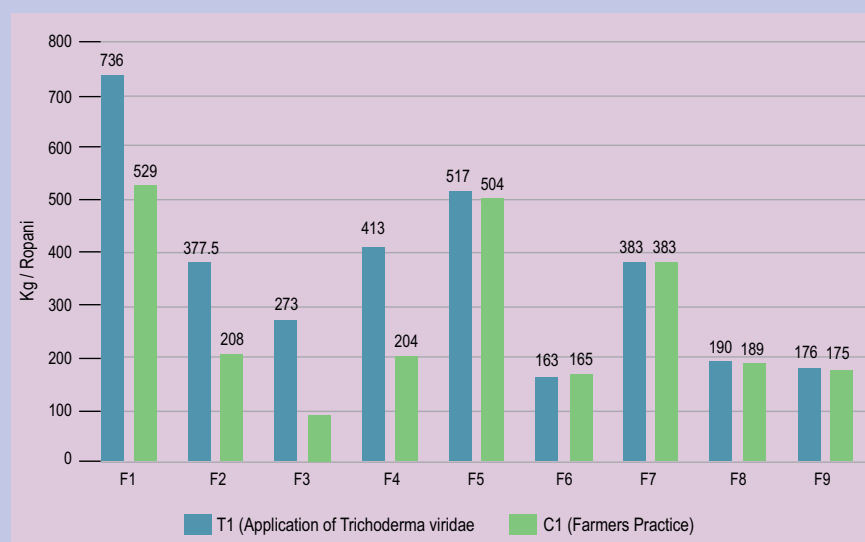
In 2019, farmers preferred potato variety, *Axona*, that demonstrated field tolerance to late blight disease, was popularized. We distributed more than two tonnes of *Axona* variety to 150 farmers on 50% cost sharing basis. In the field observation and in farmer interaction, we noticed that the number of chemical sprays for *Axona* variety decreased from 5-6 sprays to 3 or less during the crop growing season, thereby significantly reducing the use of chemicals.

Mr. Saroj Sapkota owner of the Panchkhal Bij Bhandar is the largest agroveter outlet in the Kavrepalanchowk says, *"five years back I hardly sold biopesticide worth NPR 5 thousand per year but now the sale has increased to NPR 7 hundred thousand last year. Production of biopesticide is very low in Nepal; if available in Nepal we do not have problem of sales"*.

Testing of bio-fungicide

Introduction of bio-fungicide *Trichoderma viridae* was another action to promote the biopesticide. In the beginning of the year 2020, a total of 350 farmers purchased *Trichoderma viridae* to apply to cucumber

Figure 1: Cucumber yield data of nine different farmers



crop. A survey was conducted to analyze the effectiveness of the *Trichoderma viridae* in cucumber in 9 different cucumber plots of 508.74 m² each. The study revealed that in five harvests their yield was increased by a range of 0% to 200% in the *Trichoderma viridae* used plots (Figure 1).

Ms Laxmi Danuwar another vegetable grower farmer in the Panchkhal area says “*We are aware that use of pesticide is hazardous to our own health but there is no other alternative option. I am using this bio-fungicide for the first time; I have seen positive result so will continue to buy next year too*”.

Linking farmers with biopesticide production centre

The biopesticides in the agrovets are mostly imported and shelf life of biopesticide is too short in comparison to chemical pesticide. Hence, the locally produced biopesticides are more effective than imported ones.

Farmers of Panchkhal are linked to Sayapatri Community IPM Resource Centre which produces *Trichoderma viridae*, entomopathogenic nematodes and Nuclear Polyhedrosis Virus (NPV). Every year this centre produces 2500 kgs of *Trichoderma*, 500 litres of Nematodes and 130 litres of NPV.

Emerging lessons

There is high demand for organic products in the market. If easily available in local market, bio-pesticides have great potential to minimize the conventional use of

pesticides. Similarly, the introduction of more disease resistant varieties is one of the efficient ways to produce safe food with minimal use of agrochemicals. Regular monitoring the use of agrochemicals, proliferation of IPM practices and technical backstopping support can reduce the prevalence of pesticide use. There are still many farmers in the Panchkhal area and other commercial vegetable growing areas, who lack knowledge on the use of personal protective equipment, use of pesticides and access to the knowledge of bio-pesticides. Hence, opportunities abound to carry forward the experience

generated by the organizations working in the field of organic farming, integrated pest management, ecological agriculture and help farmers to be healthy and produce safe food for consumers.

References

LI-BIRD, **Compendium of Good Agricultural and Livestock Farming Practices to Minimize Land-Based Water Pollution**, Pokhara, Nepal: LI-BIRD, 2019

Adhikari, P., **An overview of pesticide management in Nepal**, 2018, *The Journal of Agriculture and Environment*, 18, 95-105.

Sapkota, K.R., Sapkota, S., Sapkota S., Katuwal K., 2020. **Pesticides handling practices among potato growers in Kavrepalanchok, Nepal**, 2020, *Journal of Agriculture and Natural Resources*, 3(1): 77-87.

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Our garden, our life

Suresh Kanna

Across the world, the concept of ‘*grow your own food*’ is gaining popularity, especially in cities and towns. Rapid urbanization has increased the solid waste polluting our streets and water bodies and contributed to poverty and scarcity of fuel and water. A backyard or rooftop kitchen garden in every household can help address these challenges. This can be part of a green infrastructure strategy to create healthier urban environments and induce behavioural change among people. Citizens must be encouraged to prepare compost for use in their vegetable gardens, thereby reducing the waste that goes into landfills.

Establishing such gardens could benefit in a number of ways. They increase access to safe, nutritious and fresh food; facilitates waste management, thus keeping the environment clean and reducing health hazards; provides additional income to vulnerable groups; encourages citizens to engage positively; leads to reduced temperatures and lowers carbon emissions.

My experience with home gardening

I have been living in Trichy since 2000. Initially, we lived in a centrally located rental house that did not have any free space to grow anything. We grew some greens and herbs on our balcony using recycled bottles and other containers. About an year ago, we moved to our own house located on the outskirts of Trichy. While we built a house in an area of 800 square feet, around 1600 square feet or two-thirds of the space was left vacant to nurture a garden.

My educational background in plant science and my association with Kudumbam, an NGO based in Trichy, Tamil Nadu, India, since 1995, helped me to make a start using sustainable agriculture techniques. We first laid fence around the house. Then, we started designing our home garden.



Suresh with the produce harvested from his farm

All of my family consisting of four members: my wife Gaja, my daughter Sruthi, my son Harish, and myself, got involved in the design. Our idea for designing the home garden was very simple. We started small, with what we were interested in eating. We made a simple analysis of our family’s kitchen needs and categorised them as short-term ones, while non-kitchen needs were classified as long-term ones. We were also very cautious about spending on our garden. We decided to start with what we had, using the three ‘R’s – refuse, recycle, and reuse. In this way, we established a small home garden in our backyard eight months ago.

Plants for the kitchen

For use in our kitchen, we planted greens like *kodipasalai* (*basilla alba*), *bonnanganni*, (*alternanthera sessilis*) *kuthupasalai* (*basilla rubra*), *pulichakeerai* (*hibiscus cannabinnus*), *vendhaya keerai* (*fenugreek*), *murungakeerai* (*drumstick leaves*). These are greens

we use as accompaniments for breakfast and lunch. We normally avoid eating greens with dinner. We also have curry leaves, which we use for seasoning. We use vegetables like tomato, lady's finger, brinjal, *sundaikaai* (*solanam torvam*), cluster bean, drumstick, bitter gourd, bottle gourd, and ash gourd, which we use in dishes like *sambar* and *poriyal*.

Plants for health

We have also planted black tulsi, aloe vera, *adathoda* (*justicia adhatoda*), *arugampul* (*cynodon dactylon*), *thiruneetru patchilai*, *thuthuvalai*, *pirandai*, *betal vine*, *lemon grass*, *ranakalli*, *omavalli*, *keelanelli*, *naaikadugu*, *curry leaf*, *insulin plant*, *maruthani* and *kuppaimeni* (*achalya indica*). We call this patch our pharmacy at home. These plants help in the treatment of common ailments like cold, cough, runny nose, fever, body pain, headache, and constipation. They also help control body heat, blood pressure, and blood sugar. These herbs can be eaten raw or can be incorporated into herbal tea, soup, *sambar*, and chutney.

Plants for religious rituals

Our garden also has flowering plants like jasmine, hibiscus, *anthimantharai*, *pitchipoo*, *kagithapoo*, and *andaralipoo*. The jasmine is for my wife and daughter, while the other flowers are offered to God in our puja room. Every morning, the previous day's floral offerings are collected from the puja room and sent to the compost pit while the puja room gets fresh flowers. The petals of the hibiscus are good for blood purification. So, the day after the hibiscus flowers are offered to God, we consume the petals.

Trees

We have planted several varieties of trees that have multiple uses. We have fruit trees like mango, papaya, cashew, jackfruit, guava, *kodukkapuli*, banana, and amla or gooseberry. We have also planted trees that have value as timber: teak, *semmaram*, casuarina, neem, and *poovarasu*. The fruit trees will start yielding in two years, while the timber trees will bring benefits to our family in the long term.

Little things that make a big difference

In many places in our garden, we have placed water in used plastic bottles for thirsty birds. When they come

to drink water, they also perform pest management by eating garden pests. We do not bother about pests because the garden is not only for humans but for all living things. Peacocks, mynas, and *chittukurivi* are regular visitors to our garden. We keep an undisturbed space for the *chittukurivi* to nest. If we dig anywhere in the garden, we find plenty of earthworms; this indicates that the soil is healthy and alive.

Through this home garden, we get fresh air every morning since we work for at least an hour in the garden. It helps us stay fit and healthy and brings our family closer to nature, learning to enjoy what nature gives us. There is enough space to experience the concept of recycling. Vegetables, fruits, greens, and flowers come from the garden to the kitchen. And kitchen waste travels back to the garden as manure and compost. More importantly, we have started to conserve our own seeds and maintaining a seed bank of vegetables, pulses, herbs, greens and flowers.

This is an ecological and regenerative way of life. We concentrate on the principles of refuse, recycle, and reuse. All plants are grown in previously used plastic tubs and bottles. Most of our garden tools are made from so-called waste materials. We hope to integrate more components like chicken, fish, and goat to make our garden a comprehensive one.

We also share a lot of our garden produce with our neighbours, relatives, milkman, and scavengers, free of cost. This helps build friendly relationships with neighbours and motivates them to start their own garden.

Covid 19 and the resulting lockdown of over two months has made our family spend more time in the garden. As a result, the garden has given us plenty of produce in the form of fruits, flowers, vegetables, and greens. The sound of birds has replaced our early morning electronic alarms. Thus, our family has realised that our garden is our life.



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Value addition through solar drying

Rakesh K Warriar and Mahesh N Lade

The collective strength of women farmers is being leveraged by integrating solar drying technology with off-farm value addition of primary produce. The decentralized enterprise approach is able to cater to the demand while enabling farmers to reap better returns through processing.

India ranks foremost in the production of many fruits and vegetables. Overall, it is the second largest producer of fruits and vegetables. Despite being one of the largest producers, prevalence of malnutrition at various levels points to the fact the non-availability of consistent supply round the year. Various estimates gauge domestic post-harvest losses ranging from 20 – 30% for fruits and vegetables costing about 50,000 crores annually. Price fluctuations and shortage observed time and again is partially attributable to inadequate storage, preservation and post-harvest practices.

Farmers often are forced to sell their perishable produce at the price offered. Many a times, price realized barely covers the production costs. Producers rarely undertake processing / value addition. Value addition, when done is mostly associated with aggregation, processing and packaging at an industrial scale by commercial entities. Such processing is intensive in terms of logistics, transport and energy. Farmers thus have the risk of dealing in a low value perishable commodity while the processors reap the benefits of value addition.

Enabling farmers to add value to their produce can be one of the best options for sustainable income generation. Solar drying is one of the various post-harvest techniques



Vegetables being collectively transported to market

which aligns with decentralized processing. Perishable food produce dehydrated in such a manner prolongs shelf life while preserving colour, nutritional value and aroma at the same time. With changing lifestyles and growing preference for ready to cook food items, there is immense potential in this line of business. In light of the above, dehydration of fruits and vegetables through solar drying was piloted by BAIF in Urulikanchan cluster in Pune.

The Initiative

BAIF has been promoting sustainable livelihood avenues enabling year-round income for the small and marginal farmers in Urulikanchan region. Average land holding in the cluster is about 4 acres with a fifth of the population falling below poverty line. Irrigated tracts are prosperous but the rest of the region is less developed.

Situated on the outskirts of Pune city, Urulikanchan is a typical example of semi-urban area where most of the farmers are involved in the cultivation of leafy vegetables, tomato, onion, sugarcane etc. Seasonal variation leads to cyclic production and supply patterns but demand for specific products are either constant or not aligned with the supply cycle. Post-harvest options like storing in cold storage are very limited and expensive. Many times, the price realized barely covers the production costs. The cluster being near to the hotels / eateries on the highway, a latent need for assured supply of certain products round the year was realized. The requirement for a cushion against price fluctuation and distress sale was thus felt strongly which was the triggering point for the enterprise initiative. Dehydration of fruits and vegetables through solar drying was thus introduced on a pilot basis in Urulikanchan.

The initial pilot was set up in a decentralized manner (i.e. one dryer per participant) in Urulikanchan cluster. Various technologies were introduced as part of a technology dissemination initiative for livelihoods and solar dryer was one amongst other few. One dryer per participant was set up. Solar dryer incorporates the crucial aspect of filtering Ultra Violet (UV) rays of the sun and so the dried products retain their colour, aroma and nutrition which are otherwise lost in open sun drying. It is hence aptly referred to as “*Taazgi sadaa..... Swadisht hamesha.....*”.

Women have formed into groups to undertake drying at the household level and aggregation, packing and marketing at the group level. This approach ensures that women are able to earn by working from their households while leveraging economies of scale through collective action. The initiative is designed on the following lines.

1. Local procurement of B/C grade cheap vegetables or preferably use own produce.
2. Cutting, drying, powdering (if required) & packing in hygienic, moisture free conditions.
3. Market linkage – procurement agencies, local market, food chains etc.

Multiple vegetables/products are being used for solar drying like tomato, ginger, onion, stevia, moringa leaves, spinach, fenugreek etc. Some instant / ready to eat products were also developed locally like dried sapota (Chiku) chips, instant Puran chapati (Maharashtrian dish), Instant Palak and Methi paratha, beetroot powder etc. The raw materials used for drying are either produced by participants or procured locally from other farmers. Packaging is done by participants for bulk orders after quality check and for retail orders packaging and labeling is done at the Sankalp store. The approach followed is that of drying at individual level and then aggregating at group level. This ensures that women can work from the confines of their homes but can also leverage their collective strength for catering to scope and scale of demand.

Following simple matrix defines the product portfolio and viability.

Vegetable – Currently produced Product – Market available (1st preference)	Vegetable – Currently not produced Product – Market available (2nd preference)
Vegetable – Currently produced Product – Market not available (Low preference)	Vegetable – Currently not produced Product – Market not available (Least preference)

The products are sold through two channels – one is through the retail outlet “Sankalp”. The women groups promoted earlier are now federated which now operates enterprise-level activities. Under this federation, an outlet for food and cosmetics products was established in 2013 at Urulikanchan which is known by the name “Sankalp”. Another way of marketing is through wholesale orders.

The approach ensures that women are able to earn by working from their households while leveraging economies of scale through collective action.

Box 1: Details of solar dryer unit

For catering to demand and viable operations, it is desirable to have an operating unit with 15 – 20 dryers with a wet loading capacity of about 20 kg per dryer (2m x 2m size). Dryers should be in operation for 20 days per month for 8 – 9 months in a year. The probable product portfolio with an established market is as follows.

1. Vegetables like tomato, bitter gourd, bottle gourd, cucumber, pumpkin etc. (Drying ratio: 10 kg:1kg, wet loading capacity: 15 kg per batch)
2. Vegetables like ginger, okra, chilli etc. (Drying ratio: 6kg:1kg, wet loading capacity: 17-20 kg per batch)
3. Leaves like spinach, neem, *tulsi* (Basil), drumstick etc. (Drying ratio: 5kg:1kg, wet loading capacity: 10 kg per batch)
4. Sprouts like *moong*, *matki* etc. (Drying ratio: 1.5kg:1kg, wet loading capacity: 15 kg per batch)

The enterprise operations, management, maintenance is done by members only. Hand holding support and training are provided by BAIF team. Daily drying, management and maintenance of dryers is done by individual participants. Solar dryers have the important advantage of “zero running” cost. Further, as there are no moving or electrical components, maintenance is negligible. However, some minor issues like damage of UV filter sheet during sudden storm was observed once.

Scaling up

Semi arid climatic condition in the region has been very conducive in adopting the technology. The participants by using solar dryers developed various food products. They could also process B and C grade vegetables which are otherwise discarded as agricultural waste. At present, each participant member is able to earn an additional monthly income of 2,500 – 3,000 through the initiative.

Based on the benefits from the pilot initiative, there was a demand from the community to set up some more solar dryers. Another 100 dryers were set up during 2018 and 2019. Around 20% of the cost was contributed by the members. While there is some promotional support, operational expenditure is borne by the group.

The group has commenced marketing under the brand “NutriSol” (indicating preservation of “nutrition” through “solar” drying). The members have been trained in aspects of hygienic processing, packaging and marketing. At present, the group is focusing on establishing a robust forward linkage. With full-fledged

operations for 8 – 9 months in a year (excluding lean period of monsoon), the enterprise can realise returns in the range of 20-30%. Operational viability offers an attractive payback ranging from 1 – 3 years based on the product category being catered to.

This is a new and emerging area sustainably harnessing the natural resource of solar energy. Also, low cost preservation is advantageous and helps in price hedging. However, the enterprise is not devoid of challenges. Solar dryers cannot be operated optimally during rainy season when ample quantity of vegetables is available. Market for dehydrated vegetables is huge. However, the linkage is still in developing stage and so having assured demand and marketing are challenges. Enterprise works on the underlying principle of surplus utilization. At times, demand surges / other distortions tilt the benefit towards sale of fresh vegetables. In such instances, solar dryer enterprise faces raw material shortage. Presently, the enterprise is capable of handling orders of limited size only.

With all its limitations, the initiative is found to be apt for the tropics. With a steady back-end supply of raw materials, the initiative can cater to a wide spectrum of demand. Such a decentralized enterprise model can empower women, strengthen rural economy and contribute positively to the environment.

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Biodiversity, Genetic Resources and Intellectual Property Developments in Access and Benefit Sharing

Kamalesh Adhikari, Charles Lawson, 2020, *Routledge*, 280 p., ISBN 9780367592172

Debates about Access and Benefit Sharing (ABS) have moved on in recent years. An initial focus on the legal obligations established by international agreements like the United Nations *Convention on Biological Diversity* and the form of obligations for collecting physical biological materials have now moved to a far more complex series of disputes and challenges about the ways ABS should be implemented and enforced. This collection of chapters examines what is new, what has been changed, and what might be changed in response to the growing acceptance and prevalence of ABS of genetic resources.

The book explores key historical, doctrinal, and theoretical issues in the field, at the same time developing new ideas and perspectives around ABS. It shows the latest state of knowledge and will be of interest to researchers, academics, policymakers, and students in the fields of intellectual property, governance, biodiversity and conservation, sustainable development, and agriculture.

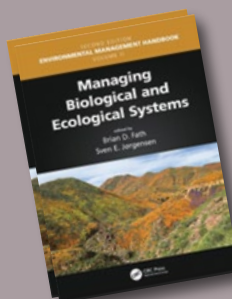
Managing Biological and Ecological Systems

Brian D. Fath, Sven Erik Jorgensen, 2020, *CRC Press*, 427 p., ISBN 9781138342644

Bringing together a wealth of knowledge, *Environmental Management Handbook, Second Edition*, gives a comprehensive overview of environmental problems, their sources, their assessment, and their solutions. Through in-depth entries and a topical table of contents, readers will quickly find answers to questions about environmental problems and their corresponding management issues. This six-volume set features insights from more than 400 contributors, all experts in their field.

The experience, evidence, methods, and models used in studying environmental management are presented here in six stand-alone volumes, arranged along the major environmental systems.

In this second volume, *Managing Biological and Ecological Systems*, the reader is introduced to the general concepts and processes of the biosphere and all its systems. This volume explains how these systems function and provides strategies on how to best manage them. It serves as an excellent resource for finding basic knowledge on the biosphere and ecological systems and includes important problems and solutions that environmental managers face today. This book practically demonstrates the key processes, methods, and models used in studying environmental management.



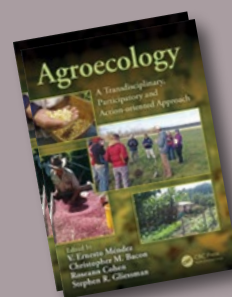
Agroecology

A Transdisciplinary, Participatory and Action-oriented Approach

V. Ernesto Méndez, Christopher M. Bacon, Roseann Cohen, Stephen R. Gliessman, 2020, *CRC Press*, 284 p., ISBN 9780367436018

Agroecology: A Transdisciplinary, Participatory and Action-oriented Approach is the first book to focus on agroecology as a transdisciplinary, participatory, and action-oriented process. Using a combined theoretical and practical approach, this collection of work engages social actors on different geo-political scales to transform the global agrifood system.

An explicit and critical discussion of diverse perspectives in the growing field of agroecology, this book covers the conceptual and empirical material of an agroecological approach that aspires to be more transdisciplinary, participatory, and action-oriented. In addition to illustrating systems of agroecology that will improve food systems around the world, it lays the groundwork for further innovations to create better sustainability for all people, ecologies, and landscapes.



SOURCES



Processing of Fruits and Vegetables From Farm to Fork

Khursheed Alam Khan, Megh R. Goyal, Abhimannu A. Kalne, 2019, Apple Academic Press, 324 p., ISBN 9781771887083

This volume looks at new and established processing technologies for fruits and vegetables, taking into consideration the physical and biochemical properties of fruits and vegetables and their products, the challenges of the processing industry, the effect of processing on nutritional content, economic utilization of bio-wastes and by-products, and much more.

Divided into several sections, the volume covers:

- processing and antioxidant/enzyme profiles of fruits and vegetables
- novel processing technologies in fruits and vegetables
- the challenges and solutions in waste reduction, negative effects of processing, and effects of processing on vitamins of fruits and vegetables

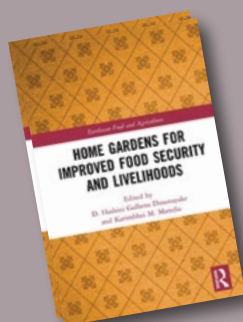
Home Gardens for Improved Food Security and Livelihoods

D. Hashini Galhena Dissanayake, Karimbhai M. Maredia, 2020, Routledge, 238 p., ISBN 9781138202139

Home Gardens for Improved Food Security and Livelihoods demonstrates how home gardens hold particular significance for resource-poor and marginalized communities in developing countries, and how they offer a versatile strategy toward building local and more resilient food systems.

This book shows that when implemented properly, home gardens can become just such an innovative solution, as well as an integral part of sustainable food security programs. It provides a conceptual overview of social, economic, environmental and nutritional issues related to home gardening in diverse contexts, including gender issues and biodiversity conservation, and presents case studies from Africa, Asia and Latin America highlighting home gardening experiences and initiatives. The volume concludes with a synthesis of key lessons learned and ways forward for further enhancing home gardens for sustainable food security and development.

This book will be a useful read for students and scholars working on local food systems, food security, sustainable development and more broadly development strategy.



Urban Allotment Gardens in Europe

Simon Bell, Runrid Fox-Kämper, Nazila Keshavarz, Mary Benson, Silvio Caputo, Susan Noori, Annette Voigt, 2018, Routledge, 384 p., ISBN 9781138588967

Although urban allotment gardening dates back to the nineteenth century, it has recently undergone a renaissance of interest and popularity. This book presents a comprehensive, research-based overview of the various features, benefits and values associated with urban allotment gardening in Europe.

The book is based on a European COST Action project, which brings together researchers and practitioners from all over Europe for the first detailed exploration of the subject on a continent-wide scale. It assesses the policy, planning and design aspects, as well as the social and ecological benefits of urban allotment gardening.

The book provides a multidisciplinary perspective, including insights from horticulture and soil science, ecology, sociology, urban geography, landscape, planning and design. The themes are underpinned by case studies from a number of European countries which supply a wide range of examples to illustrate different key issues.



Urban farming initiatives

Deborah Dutta

Urban spaces need to radically rethink their relationship with food in terms of production and consumption as climate change, land degradation due to industrialised farming present a serious challenge to food security. Community-based urban farming initiatives are proving to be an effective way to create sensitivity, critical awareness and connection with the land, farmers and ecosystems.

Half of the world's population lives in cities. The unprecedented rate of urbanization in the past century is a significant contributor to the rapid degradation of the environment. The expanding urban environment has been linked to food insecurity, global warming, climate change, air pollution, over exploitation of water resources and decrease in forest cover, among other problems. Yet, given the trend of urbanisation, it is clear that the design of cities, and how we live in them will play a key role in facing the challenges of sustainability.

Urban farming, a platform for collective practice

Food security and production are intimately connected with urbanisation, and related ecological issues, but these connections are not readily visible. Urban spaces are usually far removed from the site of farming. Food is routinely transported thousands of kilometers through various intermediaries, a process that increases the cost as well as the ecological footprint of the food. This system of food procurement is exploitative for the farmers as well.

In recent years, an interesting counter-narrative has emerged. India is also seeing a small, but noticeable trend of people quitting their jobs in the corporate sector to pursue farming as a vocation. This is for a number of reasons, with food safety and ecological integrity being a prime focus. This trend is accompanied by a revival of, and search for, ecologically-





Photo: Dipti

Dipti with a basketful of produce from her apartment garden

sound methods of farming that were embedded in traditional practices. This article is about one such urban initiative, a community urban farm.

Dream Grove (DG) - A community-led urban farm

Dream grove is an urban community farming initiative within a 800 sq ft public park in Mumbai. The park's earlier neglected condition prompted a local resident Marie Paul to convert it into a more welcoming space for the children and elderly in 2018. She formed a local neighborhood group to maintain the park on a voluntary basis. Two of the group members, Premila Martis and Dipti Jhangiani (see box 1) had prior experience growing edible plants as a volunteer with a city farming group called Urban Leaves.

Martis took initiative in getting everyone to collect fallen leaf litter, kitchen waste and, coconut husks from the neighbourhood and began composting them in heaps in the park using cattle dung and urine to aid the process (A process termed as making *Amrit Mitti*). The nutrient-rich soil organic matter was then used to grow organic fruits and vegetables. Initially, the Brihan Mumbai Municipal Corporation (BMC) was apprehensive of the idea, but the response of the locals and the physical transformation of the place prompted them to help with the upkeep of the park. Now, they also seem invested in the idea of such community-led food gardens.

According to Jhangiani, in the past two years, they have grown over 50 variety of edible plants including fruits, vegetables and herbs. Seasonal harvest include pineapples, bananas, yam, radishes, tomatoes, bitter gourd, chillies, and okras to name a few. Most importantly, Martis commented that people's physical

Box 1: Volunteer Profiles

Premila Martis with an educational background in finance, took voluntary retirement from her job and joined a community city-farming group (Urban Leaves) in 2013. She participated in a workshop about kitchen gardening conducted by Urban Leaves.

Dipti Jhangiani with a background in journalism, took interest in recycling wastes. She regularly started composting at home, and later became a volunteer at Urban Leaves.

participation in activities like composting, tilling, plant-care etc., helped them attune themselves more closely to the process of growing food. The involvement of diverse age-group, ranging from 7 to 80 years, has led to new forms of intergenerational cohesion and dialogue. On an average, 20 DG volunteers visit the park on weekends to participate in sowing, planting, harvesting and watering activities. In her words, “... *when you are personally involved, do you understand the importance of such an initiative. We’re not only growing plants, but we’re growing as human beings*”.

The group expanded their sphere of activities to connect with a nearby weekend farmers’ market to procure organic seeds, and salvage the leftovers and waste at the end of the day for composting. Their increased interest and concern regarding the conditions of the food system led Premila to form a ‘Growers to Bandra Homes’ group during the lockdown, where she began to actively source and procure harvest directly from the farmers or farmer produce aggregators. Gradually, the network has been expanding as other members also began introducing more farmer produce in the group through friends or family.

Building a network of trust during the lockdown

Premila Martis had already been sourcing rice and grains from some organic farmers for the past few years. She took the initiative of forming an online WhatsApp group (Grower to Bandra Homes) where farmers could share about their produce. According to her, the details shared by the farmers helped build a sense of trust and connection with them. For instance, one of the farmers

Amrit-Mitti is made by decomposing dry bio-mass, comprising mostly of dry leaves, using an organic accelerator called *Amrut-Jal*, which is made from a mixture of water, cattle urine, cattle dung and organic black jaggery.

who sold their produce on the group is Susheel Borkar. Although a businessman by profession, he maintains that his heart lies in tending to the land, and he has been doing so every weekend for the past 30 years. He attributes his love for nature to his experiences of being part of a wildlife club at the Indian Institute of Technology (IIT) as a student. He doesn’t use any chemical fertilizers or pesticides, and is mindful of the evolving food ecosystem at the farm. He posted about his produce on the group as follows:

“We are pleased to advise you that we are planning delivery of our farm products this week. We follow Padmashri Subhash Palekar’s Natural Farming (SPNF) method, which promotes use of gobar-based Ghanamrut & Jivamrut. For preparing the same, we now have a total of 18 desi cattle (cows, bulls & young ones). And we do not milk the cows, by the way. All our products are farmed 100% SPNF (natural organic)”.

Our mangoes are available in three varieties : Hapoos (80% of our mango crop), Ratnaa (10%), Keshar (10%). Mangoes are harvested at the last minute, so as to allow them to tree-mature fully, and then, ripened in rice straw. The mangoes being delivered would be in ripe / semi-ripe condition. Minimum order quantity is 8 dozens. On mango size, pls be flexible +1 / -1.

Consumers also shared their own experience of buying and using food products from individual farmers, to help in popularizing or creating awareness regarding their use. According to Dipti, their experiences of seasonal patterns of fruiting in plants also allowed them to understand and appreciate what was available for a particular month.

Active participation in creating mechanisms to support local produce supplies

The group members also took on responsibilities of buying in bulk from farmers and dividing the produce at their end, so that the cost of trips from farms to cities could be minimised. Rather than being passive recipients, individuals also felt ownership for the produce and

Sensitisation of urban consumers based on community based experiences, can help garner the demand and support needed for sustainable farming initiatives.

empathy for the farmers. For instance, the group got together to buy onions and fruits from different farmers, and sorted out the distribution amongst themselves.

This is not to say that all deliveries would go as planned, and sometimes managing the logistics or quality of the produce would be difficult. Yet, Premila found herself continuing to take the lead in connecting farmers or aggregators with consumers because she felt that she was learning about food diversity in much more detail. She commented that passing on such information to others in the group also helped them take an active interest in sourcing food.

Virtuous circles of feedback and empowerment

Constant dialogues and feedback from the farmers helped the group feel empowered through their choices and collective efforts.

“For those of us who bought onions, a big thank you to Amit for coordinating with Avi, the onion farmer and organising the delivery and distribution. FYI, Avi and his neighbour farmers had 6 tonnes of summer onions and refused to give in to low prices of traders and decided to supply to Mumbai personally. They did 1500 kgs last week. We were a small part at 100 kgs but it feels nice.”

The group's support was also extended to extremely small-scale produce (such as coconuts, pickles etc), thereby creating hyper-local supply chains.

A way forward: Supporting farmer produce through local initiatives

The narratives and examples indicate that group's sustained participation in urban farming initiatives can help them empathise and appreciate the efforts put in by farmers. They were willing to accept discrepancies in amount or quality, with the understanding of how local climate can affect the produce. The regular feedback and dialogue enabled them to feel a sense of partnership with the farmers rather than just being passive consumers. Building a relationship of trust led both parties to be willing to go the extra mile to ensure the satisfaction of other (quality for consumers, and fair price for the farmers).

Sensitisation of urban consumers based on community based experiences, can help garner the demand and support needed for sustainable farming initiatives. Active

collaborations between farmers' markets and voluntary organisations could be a way of enabling hyper-local supply chains, and even forming alternative means of economic transactions through barter, volunteering time, resources etc. Enabling infrastructure or resources to encourage and sustain city-farming initiatives such as the concept of allotment gardens, should be part of policy recommendation for city-planning. City-based food gardens can play a crucial role in creating critical awareness and networks to actively support local farmers. Such initiatives should find a place in policies oriented towards city-planning.

References

Dutta, D., & Chandrasekharan, S. (2018). **Doing to being: farming actions in a community coalesce into pro-environment motivations and values.** *Environmental Education Research*, 24(8), 1192-1210.

Parnell, S., Elmqvist, T., McPhearson, T., Nagendra, H., & Sörlin, S. (2018). **Introduction: Situating knowledge and action for an urban planet.** *The urban planet: knowledge towards sustainable cities*, 1-16.

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Digital solutions for marketing

Venkat Maroju

The Haryana Horticulture Department and SourceTrace digital platform collaborated bringing producers and buyers onto one common platform. The digital initiative empowers the FPOs to negotiate for a higher price from the market, thereby bringing monetary returns to the growers.

Horticulture has not only improved the economic status of farmers but has also played a significant role in women's endowment, increasing employability in areas like mushroom cultivation, strawberry picking, floriculture, and vegetable seed production industry. This sector constitutes over 24.5 percent from a mere 8.5 arable land to GDP of Agriculture in India. The production of both fruit and vegetable crops lends India as a huge exporter of fresh temperate fruits and vegetables.

However, the challenges for small farmers in agribusiness has become a great cause of concern as horticulture is all about the delicate balance of fresh produce, transportation to warehouses, or direct selling to buyers at the most reasonable and current market rate.

Shifting crops

The pandemic has disrupted the vegetable and fruit farming industry. Enough news has been around wastages and rotten fresh produce, mostly due to broken transport logistics. Industry sources claim a 20-30 percent drop in vegetable seed selling. While growers are confronting issues including transportation, marketing of vegetables, lack of tools, acute shortage of labour for harvesting their crops, many are turning to cereal cultivation.

As shared by the National Seed Association of India (NSAI), a few states moved towards maize cultivation instead of vegetables like Madhya Pradesh, Uttar Pradesh, and Bihar. NSAI also mentioned that tomato cultivation might take a major hit, along with ladyfinger, pumpkin, and bottle gourd (lauki). There was speculation about a massive drop in the cultivation of cauliflower (gobi) across India. In contrast, onion seeds did well in Madhya Pradesh, and therefore, a decent onion crop can be expected.

According to the Vegetable Growers Association of India (VGAI), heavy losses incurred during the lockdown by the horticulturists, attributing to the closing of the APMC (Agriculture Produce Market Committee) they are unwilling to stick to vegetables & fruit farming. A big chunk of them has diversified into sugarcane farming too.

During the lockdown, a percentage of small and marginal farmers in Maharashtra joined hands with housing societies and farmer groups connected to the housing complexes, to sell fresh vegetables and fruits at the doorsteps of these societies. Naturally, the profits were earned directly by cultivators and consumers got better deals. However, these experiments were limited to villages located near the city fringes.

Existing agri-technologies in Fruits & Vegetables Industry

When it comes to applying technologies in horticulture, the application of digital technologies are being implemented in primarily three ways; Digitisation of Farms providing farmers with an overview of their entire operations from production, pest control, inventory management, and tracking. Secondly, Climate-Smart Precision Farming aiding growers with data-driven decision-making using sensing technology to records varied parameters of soil, environment and crop. Third, the Agri Market Place primarily for price alerts, agricultural news, government mandi prices in local languages where possible, connecting farmers to sellers, and facilitates price discovery through discussion.

This primarily results in saving costs (water, energy, fertilizers, and pesticides), prevents product losses (controlled weather conditions, adequate harvest times), and optimizes routine field tasks by automating the processes. Additionally, real-time alerts on crops to make any prior adjustments to reach optimal yield is also a plus.

Organizing the farmers digitally

Small Farmers Agri-business Consortium (SFACH) and Haryana Horticulture Department, deployed digital solutions by SourceTrace to support horticulture farmers. The Haryana Horticulture Department is committed to delivering a responsive and operative mechanism for the welfare of farmers and farm-based communities. These organizations recognize the need to harness the escalating IT for the progress of the life of the farmers and of the management of FPOs in the state, this project involves creating about 100,000 farmer profiles and digitizing their farms.

Dr. Arjun Singh Saini, Managing Director of SFACH, India stated, *‘Our vision is to strengthen farming communities through extensive use of Information Technology in Agriculture; we envisage a scenario*

wherein every farmer and member of FPOs shall be able to access the benefits of a comprehensive platform like SourceTrace for speedy and easy access to horticulture service, leading to a better quality of life for the farmers in the State.’

Multi-pronged impetus to farmers

To take advantage of generous harvests, the Haryana Horticulture Department and SourceTrace digital platform collaborated for market linkages, bringing producers and buyers onto one common platform, enabling buyers to procure fresh produce directly from the FPOs and farmers. The department encourages probable buyers (exporter, mandi buyer, local retailer) to register on the portal, then look up the product using filters such as district, crop, variety, grade, and FPO. The digitized profile of the growers enables the display of the quantity available of the produce in real-time, alongside the contact details of the person at the FPO, hence shortening the buying process to close the deal.

Firstly, the absence of timely and routine advice on managing pest and crop diseases is being addressed by the farmer mobile application that connects growers with experts via crop-based advisory. To simplify and ensure their ease-of-use of the mobile services, the user interface is designed keeping in mind the need for flexibility, local languages, and quick reach to the experts.

The application is easily downloaded from the google play store, and the simple registering process helps the farmer fetch the pests and diseases menu. It is made possible using preloaded pictures of major pests and diseases within the system, in collaboration with and approval of the Indian Council of Agriculture Research (ICAR). The user can effortlessly match the pest/disease in the field, and pre-fed recommendations are available. If not, the grower can click a picture of the affected plant and upload it with comments. This information is directed to the expert or scientist from the agriculture department, who responds with an advisory delivered through SMS to the farmer.

Secondly, this digital platform connects farmers to FPOs and their corresponding clusters (456 clusters participated) in the state of Haryana, providing the department with an overview of clusters/FPOs/farmers. The details include real-time data on the crop, production, input application, and schemes valid. The program

The digital platform not only eliminated middlemen but also fetched better price for the produce.



Photo: Source Trace

Digitally empowered farmer

also acts as a tool for the Department of Horticulture to deliver information on government schemes, any information on seeds, benefits, and advice to farmers through the farmer app.

Lastly, the solution empowers the FPO to aggregate the yield of the member farmers and sell to prospective purchasers. The availability of large bulk volumes of specific kinds of produce the FPO can negotiate for a higher price from the market, thereby bringing monetary returns to the growers.

The company, so far, has involved 34,382 farmers, over 46000 acres of land with a varied crops over 60 commodities.

Two-way communication with producers

The online program covers major pests and diseases along with the advisory solutions usually preloaded into the system. When the pest/ disease in the application matches with the live pest/ disease in the field, then farmer can follow the recommendation in their local language for easy comprehension and immediate action.

In case if it does not match then using his phone, the farmer can take the picture of the live crop and upload it by adding the comments. These immediately reach the server as a notification to the expert/scientist in the department of agriculture. Thereafter, the field expert/scientist responds to the issues and send an advisory, the farmer receives the message stating – that the advisory requested from you is resolved with date and product. The SMS notifies the farmer to check the application for the recommended action helping farmer receive on-time and accurate information.

FPO's are using mobile based technology

Organising farmer profiles, geo- fencing their farms, capturing real-time data on crop production and inputs were made seamlessly possible. Regular alerts on cluster-based weather information and advisories sent as SMS messages made it relatively easier for 384 FPO's involved to take strategic business decisions based on the insights of the data digitized.

Market linkages made possible

The FPO's were able to publish the available produce to potential buyers, making the transactions simpler and online. Not only did the middlemen were eliminated, the farmers could fetch fairer prices for their produce.

Connecting farmers to the external world

The pre-fed languages into the mobile app, empowers the farmers to access information on crops, seeds, buyers and reach the crop scientists in shortest time. They get access to the real time advisories on crop specific pest and diseases, seek expert's assistance on updated information on new farm inputs and machinery and also gain knowledge of various schemes and benefits the government or banks are providing; all of this under one source, easily available and possible to comprehend.



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