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LEISA INDIA

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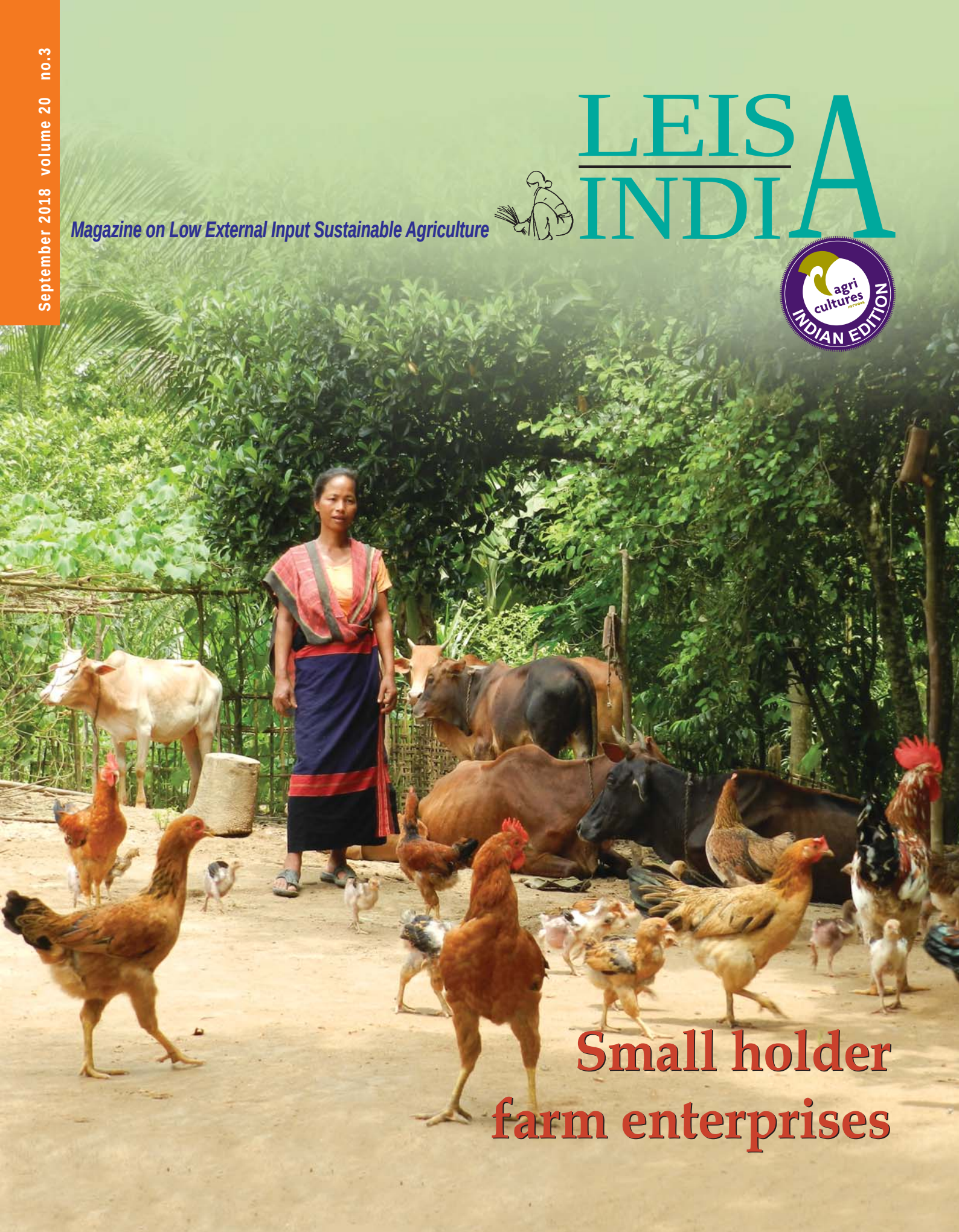

Small holder farm enterprises

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September 2018 Volume 20 no. 3

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COVER PHOTO

Backyard poultry is a good source of income with little investment.
(Source: Anshuman Das, Welthungerhilfe)

The AgriCultures Network

LEISA India is a member of the global Agricultures Network. Seven organisations that provide information on small-scale, sustainable agriculture worldwide, and that publish:

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www.leisaindia.org

Dear Readers

Small farmers, the majority who depend on rainfed agriculture are increasingly finding it difficult to make living only out of crop production. Given the changing climatic conditions, reaping one single harvest is also becoming an uncertainty to most of them. In such conditions, farm based enterprises like small livestock, backyard poultry, mushroom production, kitchen gardens have a great potential to generate income and provide employment for a longer period of time. This in turn motivates farmers to remain in agriculture and pursue livelihoods that are familiar to them, rather than migrate to far-off places in search of wage employment.

This issue puts together some of the ground experiences which show how farmers are making a living by integrating various farm based enterprises. These stories highlight that, small scale farm based enterprises besides generating income and employment, also address issues like family nutrition and resource recycling. Being less risky, they have the potential to alleviate rural poverty.

We are extremely grateful to those who contribute articles, creating new hope and visibility to unsung initiatives. We are also thankful to all those who are supporting the magazine through voluntary contributions. You may also use this platform for wider sharing of eco-friendly services, products and events.

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.

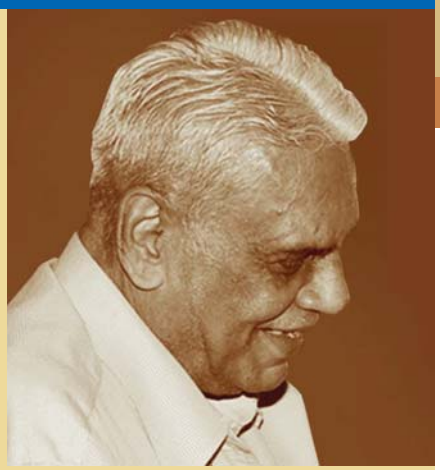
AMEF is a member of AgriCultures Network, which is involved in co-creation and sharing of knowledge on family farming and agro ecology. The network is **locally rooted and globally connected**. Besides magazines, the network is involved in multi stake holders' engagement and policy advocacy for promotion 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.

MISEREOR founded in 1958 is the German Catholic Bishops' Organisation for Development Cooperation. For over 50 years MISEREOR has been committed to fighting poverty in Africa, Asia and Latin America. MISEREOR's support is available to any human being in need – regardless of their religion, ethnicity or gender. MISEREOR believes in supporting initiatives driven and owned by the poor and the disadvantaged. It prefers to work in partnership with its local partners. Together with the beneficiaries, the partners involved help shape local development processes and implement the projects. This is how MISEREOR, together with its partners, responds to constantly changing challenges. (www.misereor.de; www.misereor.org)

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**

Obituary



Dr. R Dwarakinath (1926-2018)

Dr. R Dwarakinath, one of the pioneers of the country's agricultural extension system and the founder Chair person of AMEF, passed away on 29th September 2018.

Dr. Dwarakinath, who relentlessly strived for promoting sustainable agriculture, was known for his vision, clarity of purpose, deep commitment for farmer's welfare and forceful suggestions for simple and doable action. With an enviable academic background, he handled illustrious positions. He was bestowed with civilian honors by the State of Karnataka. He was considered as *Bhisma Pitamaha* of agricultural development and extension.

The most distinctive feature of his professional background was not resting on his laurels, but being incredibly successful in bringing his vision operationalised with farming communities. This he did consistently in every position he held - as Director of Agriculture, Vice Chancellor, Chairperson and member of several policy making bodies and as Chairman, AME Foundation.

He was an excellent communicator too. His deep sense of commitment for farmer centric agricultural development reflected in his writings which had deep clarity of purpose, clear sense of direction, profound vision, and simple practical solutions. His contributions on dry land farming are pragmatic and thought provoking. Besides being an excellent orator and communicator, a popular teacher and a farmer's friend, he was simple at heart and relentless in his commitment to help the farmers.

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Small holder farm enterprises

Smallholders, the food providers of the nation, are becoming increasingly vulnerable to a series of challenges like the changing climate, markets, finance, input availability etc. These challenges have made crop production more risky and uncertain in an already fragile food production systems, in which these small farmers operate. While majority depend on a single crop, these challenges limit them further to remain at the subsistence level. This in turn pushes them to poverty. Poor nutrition results in poor health, further impacting their productive capacities.

Many small farmers are however, trying to address a range of issues like food security, family nutrition, year round employment and additional incomes, by two ways - practising eco-friendly ways of crop production, and diversifying their farm production. This issue brings out experiences of some of those enterprising farmers who have made their farming lives better by diversifying and integrated farming.

Farm diversity is the key

Agro ecology and farm diversity go hand in hand. Farmers switching to eco-friendly ways of crop production focus on nurturing a healthy crop without disturbing its agro-ecosystem. Farmers following such agroecological practices are able to grow crops that can withstand vagaries of nature. For example, Malleshappa applies plenty of compost and vermicompost to the soil to enhance the organic content of the soil. Such organic soils hold rainwater better. He also applies *'keetajanya nashaka'*, a biological pesticide to control pests, instead of pesticides (Ganga Ankad, p.10)

Farmers are increasingly including enterprises like kitchen gardens, mushroom production, backyard poultry etc., to their existing crop production. Besides generating additional income and employment, integration of enterprises encourages resource recycling – an output of one enterprise becomes an input to other, thus facilitating efficient resource use and also reducing production costs. Farmers are recycling resources in several ways. For example, Malleshappa uses the agriculture wastes of jowar, maize, soyabean, tur, cow pea as hay and dung is recycled as vermicompost and biogas. (Ganga Ankad, p.10). Mrs. Indira in Alappuza uses fodder and natural grasses to feed livestock while its urine is applied to crops. She uses coconut residues as mulching material (Anithakumari, Merin Babu and S Indhuja, p.16). Farmers in Chikkayemmiganur village sell maize cobs to a company in Challakere which transforms them to briquettes, a greener alternative to fossil fuels. (H R Mallesh and T Parthasarathy, p.32). Sukhjeet Singh, a farmer in Punjab washes the dung, goat and pig feaces into the fish pond which serve as feed and fertiliser. He feeds the goats with agriculture waste and pigs are fed with kitchen waste, thus keeping the costs low. (Amandeep Singh and Gurpreet Kour, p.27)

Majority of the farmers add on farm based enterprises, primarily to enhance their farm incomes. Experience has shown that farmers with very small pieces of land too can make good income from such enterprises, especially in the off-seasons, when there is no crop nor income to support the family. For instance, Maheshappa earns more than two lakh rupees annually from a meagre one hectare of land through sale of vegetables, fodder and milk. (Ganga Ankad, p.10). However, over time, farmers also recognise that they realise many more benefits beyond incomes, when they integrate enterprises. Family nutrition is foremost among them. With better access to home grown vegetables, milk, chicken etc., they get better food and nutrition over a longer period of time. For example,

in Kerala, most of the home food needs are met from the homestead itself - pulses, roots and tubers, green leafy vegetables, fruits and vegetables. Other enterprises provide fresh water fish, milk and milk products, eggs, etc., providing a complete, balanced and healthy nutrition to the family. (Anithakumari, Merin Babu and S Indhuja, p.16)

Moving towards collectivisation

Farm based enterprises could be at the farm household level or graduate to operate at a community level. While operating as a collective enterprise, farmers tend to realise more returns as it cuts down costs and enhances bargaining power. For instance, the tribal communities in Jharkhand, who started producing mushrooms individually at a subsistence level, moved on to commercial scale production by pooling their resources. They could reduce expenditures on mushroom substrates, spawn, maintenance of substrate preparation yards and transporting mushroom to markets etc., by collectivisation (S Maurya, et.al., p.13). Similarly, the maize growers in Chikkayemmiganuru village, as a collective, bought inputs together, marketed as a group gaining better control over the price and also recycled maize cobs as fuel, gaining additional income. (H R Mallesh and T Parthasarathy, p.32)

Collective enterprises, however, need external support to start and takeoff. To operate successfully, they also need handholding for a longer period of time. For example, National Agricultural Innovation Project (NAIP) played a pivotal role in setting up the mushroom group enterprise in Jharkhand and inspiring the women farmers by exposure visits, demonstration programmes, hands-on trainings, providing backstopping support when they faced problems. Even after the project closure in 2011, the capacity building, hand holding and backstopping which continued till 2014-2015, has empowered the women to manage the enterprise successfully and sustainably. (S. Maurya, et.al., p.13)

Identifying key activities and building local capacities are crucial for managing the enterprise sustainably. Agencies that support projects should focus on these aspects, before they withdraw their support. For instance, the *Rural Desi Backyard Poultry (BYP)* programme, trained local women members as *para-veterinarians* on health care practices related to chicken and other livestock. Since deployment of para-veterinarians, the adoption of prescribed health care practices has increased reducing the mortality rate of chickens. (Kanna K Siripurapu, et.al., p.6)

The nature of external support is normally dependent on the mandate of the organisation. While Agriculture department focuses on promoting crop based improvements, the Animal husbandry department is more concerned about livestock. But, rural livelihoods are interdependent and therefore have to be viewed holistically. This limitation could however be overcome by coordinating efforts of multiple agencies, so that communities gain. For example, in Upparahalli village in Karnataka, while the State Department of Agriculture supported an organic farming project, BAIF, an NGO supported the communities with organic milk production. These complementary activities helped communities to reap rich dividends (M N Kulkarni and T Suresh, p.21). In the same way, the Department of Animal Husbandry (DAH) and the Tribal Welfare Department (TWD) of the Government of Andhra Pradesh (AP) came together to design the *Rural Desi Backyard Poultry (BYP)* programme for improving the income and nutrition of 13000 *Adivasi* households. (Kanna K Siripurapu, et.al., p.6)

The experiences in this issue show that farm based enterprises that are easy to manage, less risky and generate better incomes, when promoted, have the potential to alleviate rural poverty, eradicate malnutrition and create employment opportunities too. With a little external support, small scale farmers can go a long way improving their health and livelihoods.

Backyard Poultry

A success story of a tribal start-up

Kanna K Siripurapu, Aneetha Kanukolanu, Sabyasachi Das and Chandrasekhar Nemani

Backyard poultry with native breeds is easy to manage, less risky and can generate better incomes, for the poor households. It has the potential to alleviate rural poverty, eradicate malnutrition and create employment opportunities too. With a little external support, by initiating small farm enterprises, the tribal communities in Andhra Pradesh have shown that it is possible to improve health and livelihoods.

Backyard poultry is easy to manage and generates good income

Traditionally, backyard poultry comprising mainly the native breeds adapted well to the local and varying climatic conditions, accounted for 70 per cent of meat and egg production in the country. In over three decades, poultry in India has moved rapidly from the backyard (BY) to intensive commercial production. Modern poultry is one of the fastest growing industries across the world. However, it often involves large-scale commercially produced crossbreeds. Although large-scale intensive commercial poultry production has tremendously increased the availability of meat and eggs in the country, it has also had serious health and environmental consequences.

The backyard poultry programme

The small-scale, often free ranging, backyard poultry (BYP) is still the widespread animal production system in India. BYP has tremendous potential and is ideal to augment the income and nutrition of small and marginal farmers. It could be promoted either commercially or as part of an integrated model involving small and marginal farmers across the country, especially in the rainfed areas.

In this context, in 2016, the Department of Animal Husbandry (DAH) and the Tribal Welfare Department (TWD) of the Government of Andhra Pradesh (AP) designed the *Rural Desi Backyard Poultry (BYP)* programme with the objective of improving the income and nutrition of 13000 *Adivasi* households. The interventions include improvement to production systems, vaccination and healthcare services, establishment of a breeding farm enterprise and setting up of CIG (Common Interest Group) poultry fund at the cluster level. With WASSAN as the Lead Technical Agency (LTA), the programme has been initiated in 129 clusters of the 5 districts of Srikakulam, Vizianagaram, Visakhapatnam, East and West Godavari.

Women in Peddakodapalli village getting educated on the merits of backyard poultry during a CIG meeting

A tribal woman managing poultry birds in her backyard

The present article showcases the experience of the project implemented in PedaKodapalli village in Visakhapatnam district.

The Initiative

PedaKodapalli is a village in Pedabayalu mandal, with 102 households. Majority of them are poor depending on agriculture and wage labour for their livelihoods. Some households were rearing poultry in their backyards, in the past. However, they had to discontinue it for various reasons - lack of supply of native chicken breeds, predation owing to lack of proper night shelters, high mortality rate due to lack of access to health care facilities and lack of knowledge. Thereafter, the communities relied mostly on commercially produced broiler chicken meat and eggs for their consumption needs.

During the second half of 2016, WASSAN started working in this village, with the field support from LAYA, the local NGO. Community mobilization meetings were organized especially with women and self-help groups (SHGs) to explain the details of the BYP programme. Consequently, Common Interest Groups (CIG) were formed. A mandatory fee of Rs.300 is paid by all the members, of which Rs. 100 is towards one-time membership fee and the remaining Rs. 200 is a pre-paid amount paid to avail health care services for the birds. Each CIG household was supported with Rs. 3000 (Rs 2700 towards construction of night shelter for chicken and Rs 300 towards purchase of five 45-day old chicks) to initiate backyard poultry.

> With para-veterinarians providing health service, the mortality rate of chicken dropped to zero.

Backyard poultry breeding farm

A Breeder Farm was established to ensure local production and regular supply of desi chicken to local CIG members. Mr. Koda Abbaidora, a CIG member of PedaKodapalii village offered to start the BYP breeder farm and supply chicks to the CIG members.

Koda allocated half-an-acre of his land for the farm. He invested Rs.30000, while the project supported to the tune of Rs.96,500, for establishing the breeder farm. The amount was used for the infrastructure, which included construction of an enclosure/pen, fencing, purchase of water and feed dispensers, purchase of birds, purchase of feed for a year etc. The process was initiated in the second half of the year 2016. It took about six months to complete the process. The BYP breeding farm became operational in May 2017 with 60 birds.

The BYP breeder farm became a game changer with native chicken breeds being produced and supplied locally. Koda, till now, has sold 480 one-month old chicks to 86 CIG members at the price of Rs. 80/- per chick. Each household reared at least 5 - 10 chicken in their backyard.

Besides CIG members, the desi chicken were also sold in the domestic markets. Around 45 black chicks and 11 chicken were sold, providing a return of Rs.11,650. Eggs were sold only to a few select customers, as Koda preferred selling chicks over eggs. In 2017, around 65% of Koda's family income was generated from the Breeder Farm.

Access to health care and other services

The nearest government veterinary clinic is located at Paderu, around 15 kms from the village, making health services inaccessible to the local communities. To overcome this problem, the project decided to train local *para-veterinarians*. Selected members, preferably women, were trained for 2 – 3 days on health care practices related to chicken and other livestock.

Veterinary doctors of the local veterinary clinic and staff of the facilitating agency and WASSAN served as resource persons for training the *para-veterinarians*.

The trained *para-veterinarians* provide livestock health services to the communities. Two *para-veterinarians* serve every 100 households. An amount of Rs 2 is paid to the *para-veterinarian* for their services, thereby generating employment to the local people. An amount of Rs. 2 is deducted from the CIG member pre-paid amount (Rs.200 paid during enrolment), every time a bird is treated for a disease or infection. The CIG member should top-up the balance when the balance is exhausted. Since deployment of para-veterinarians, the adoption of prescribed health care practices has increased reducing the mortality rate of chickens.

Information and knowledge for services related to health care and best management practices are being supported by LAYA and WASSAN. In addition, social networks of likeminded individuals, friends, act as another source of information to the members.

Impacts

With all the households of the village rearing backyard poultry, the traditional culture of rearing native chicken breeds has come alive at PedaKodapalli village. The local communities are able to consume eggs and meat produced in their backyard, on a regular basis. Also, the chicken and eggs, produced in the backyards are healthy compared to commercially produced chicken, thus ensuring better health to the families.

With the establishment of Breeding Farm, not only are chicks accessible to the households, the entrepreneurs are also able to make a decent living by selling chicks and chicken. Chicken droppings are recycled as manure for the crops, thus enhancing soil fertility.

Desi chicken has surely made a comeback in PedaKodapalii village.

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A woman receives chicks from the project team

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The saga of sustainable *Wadi*

Ganga Ankad

Key factor for successful farming is the integration of several enterprises. When integrated applying the principles of recycling, even a small piece of land can produce enough to provide food, nutrition and income to farm families. Malleshappa is a case - journey from despair to remunerative farming.

Malleshappa grew variety of fodder species on vacant patches in his farm

Malleshappa Haklad of Kamplikoppa village in Dharwad district, Karnataka owns 1.2 ha rainfed land. The only livelihood source of the family is this piece of land; which proved to be unproductive. Malleshappa had a tough time maintaining his family with 6 children depending on the unproductive land.

In the year 1996, Kamplikoppa was selected as one of the cluster villages by BAIF, for implementing a tree based farming (Wadi) programme under its TTSD (Transfer of Technology for Sustainable Development) project. Wadi package mainly includes preparing 50 cmt trench cum bunds, establishing a farm pond (30 x 30 x 10 ft), planting 40 horticulture plants and 500-800 forestry seedlings, fodder development and setting up a vermi compost unit. The programme emphasises on integrating agriculture, horticulture, forestry and fodder in a single canopy of one acre land to ensure food, fodder, fuel security along with self employment throughout the year.

Though reluctant in the beginning, Malleshappa enrolled for the wadi programme in 1998. Initially he became a member of Self Help Group. The project support was made through SHG. Two members from each SHG in a village represented the Grama Vikas Samiti (GVS). The GVS of all the villages federated into an Apex body called 'Sarvodaya Maha Sangha', represented by 2 members from each GVS. The Federation is registered under society act and engaged in collective marketing. During the project period - from 1996 to 2002, various training programmes were organized to the members on various aspects like SHG formation, book keeping, tree based farming, after care for horticultural plants, dairy development, fodder development, calf rearing, value addition, health and hygiene, sanitation etc. Malleshappa too underwent a series of trainings, exposures on soil and water conservation, tree based farming, organic farming, livestock, fodder cultivation etc.

Malleshappa established 40 sapota plants on 0.4 hectares of land. He also planted other horticulture plants like custard apple, papaya, jackfruit, lemon, drumstick, coconut and cashew. Sapota started fruiting from 4th year onwards. Except drumstick, all other fruits are used for home consumption. On an average, Rs. 2000/- is earned by sale of drumstick. The integrated system started providing sustainable income from 6th year onwards. On an average, Malleshappa reaps an annual income of Rs. 45,000/- from horticulture plantation. Owing to good returns, Malleshappa expanded the area under horticulture to another half an acre planting 50 mango plants, from his own investment.

Integrating multiple enterprises

Malleshappa has been using the spaces in wadi for growing *intercrops*. In 2011, he started growing turmeric, as the shade effect of the 15 year old orchard suits very well for turmeric cultivation. He harvested one quintal of fingers from one gunta land. However, later, owing to rainfall deficit, he reduced the area under turmeric. Presently, he harvests about 10 kg green fingers, processes them and uses for home consumption.

He has been growing *vegetables* since 2011. He started little gourd cultivation with only one vine. He expanded the vines through stem cutting to 150 and made pandal system for spreading the vines. Fruiting starts in 2 months and continues till 10 months in an year. Malleshappa harvests 20 – 40 kg per week. He also grows cluster beans, ridge gourd, okra, brinjal, chilly, cucumber, raddish, fenugreek etc., for home consumption. Black gram is grown in 15 gunta area for home consumption which yields about one quintal.

Around 800 *forestry seedlings* of different species viz., *teak, eucalyptus, casuarina, sesbania, acacia, silver oak, glyricidea, subabul* are planted all along the border of the land. Every year, lateral branches are pruned and used as fuel wood. From fifth year, well grown few *acacia* plants are cut and used for construction of house and cattle shed. Malleshappa earns around Rs. 15,000/- annually from selling lateral branches. He provides it on contract basis for surrounding villagers at Rs. 300/- per quintal (fresh wood). In addition to this, the fuel wood requirement of his home is also met.

Different varieties of *fodder* species are grown on bunds and in between two horticulture plants. Fodder species include grasses like *Stylohamata, Stylosanthus scabra, guinea and hybrid napier* and tree species like *sesbania, glyricidia and subabul*. The green fodder from his land is sufficient to feed his cattle. He sells the extra grown root slips. On an average, every year, he sells Rs. 20,000/- worth of root slips.

With enough fodder available, Malleshappa expanded his livestock. Milk production also increased proportionate to the herd size. Presently every day, 8 litres of milk is sold in local dairy and 3 litres are being used for home consumption.

Malleshappa increased livestock numbers owing to fodder availability on his farm

Recycling resources

The technique of recycling agriculture waste to livestock feed and livestock waste to agriculture through manure has been practiced systematically. The agriculture wastes of jowar, maize, soyabean, tur, cow pea are being used as hay. In summer, the green fodder requirement is met from *sesbania, subabul and glyricidia* plants. The dung is used for vermicompost production. With the increasing animal herd size and availability of plenty of biomass, it was possible to produce sufficient compost. Sufficient manure is applied to the land while the surplus is sold. Malleshappa sells vermicompost and even worms at times, to get some additional income. On an average, he sells around 100 quintals of vermi compost. Besides producing compost, the dung is also used for producing biogas. The biogas unit was set up with the support from gram panchayat. The slurry that comes out from biogas unit goes back to the compost pit.

Rain water is being harvested regularly from the farm pond developed on his land. On an average, 4 lakh litres of water is being harvested annually. He uses the farm pond water for providing protective irrigation to intercrops, livestock and used in vermi compost preparation. He de-silts the pond every alternate year.

Reaping multiple benefits

With multiple enterprises, Malleshappa earns a good income from his hitherto unproductive land of 1.2 hectares. Annually, on an average, he gets around Rs.45000 from horticultural crops, Rs.15000 from forestry, Rs.75000 from sale of milk, Rs. 20000 from sale of fodder slips and Rs. 60000 from sale of vermicompost. This he earns besides harvesting vegetables for the household. In this way, the small piece of land is providing nutritious food to the whole family in terms of healthy vegetables, milk and milk products, different fruits and grains and an annual income to the tune of Rs.2,15,000.

Malleshappa has switched to ecofriendly ways of farming. He applies plenty of compost / vemi compost to the soil. He applies *'keetajanya nashaka'*, a biological pesticide to control the pests. He has become an expert in utilizing the available natural resources effectively. With renewed interest in farming, he has expanded his cultivation by leasing in three acres and working on 50-50 share basis on another 9 acres of land.

The economic condition brought confidence to Malleshappa's family. He has been honored for his success. He addresses the farmers, shares his experience attends trainings as resource person. His two sons assist him in agriculture. His wife Kallavva is the director of an apex body 'Sarvodaya Maha Sangha'. She is the President of milk dairy operated by SHG and now, President of Varur Gram Panchayat. All the family members are enjoying dignified life in the village.

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Mushroom enterprise

A collective effort towards empowerment

S Maurya, P R Kumar, R S Pan, A K Singh, Bikash Das and B P Bhatt

This is a story of transformation of a tribal community from life of distress to life of prosperity - a journey from destitution to economic empowerment. With knowledge as power and collective action as their strength, these tribal women have paved their own way towards prosperity and empowerment.

The tribal communities belonging to eight villages in remote and dense forests in Jama and Dumka blocks of Dumka district, depended on crop cultivation and income generating activities for their livelihoods. Paddy cultivation in rainfed lowlands served as a source of rice for food and substrate for making *Hanria*- a locally brewed rice wine. Pulses like green gram, black gram, cowpea, red gram, horse gram and certain hardy oilseeds like sesamum, niger and rapeseed were grown as natural companion crops in paddy and vegetable crops. The traditional mixed cropping system ensured nutritional security to the households. Income was earned from selling vegetables, collecting and selling mahua flowers and lac collected from forests. Making plates from Tendu, Palash and Mahua leaves and selling them was their main economic activity.

Communities took up collective production and marketing of mushrooms

Local communities grew only local traditional varieties of paddy and certain non-descript variety of cucurbitous vegetables like ash gourd, pumpkin, sponge gourd, ridge gourd etc. The area being untouched by any extension agency, local communities have been following age-old practices for crop cultivaiton. In 2009-10, National Agricultural Innovation Project (NAIP) initiated a programme to improve the livelihoods of the local tribal communities through agriculture interventions.

Farmers were first approached through gramsabha. It was observed that farmers had no experience in growing vegetable nurseries. They grew local varieties by direct planting on hills. By doing so, it restricted them to main season and the plants suffered from excessive rains, dry spells, frosts in winter etc. They were also not aware about off-season crops and off-season nursery. Hence, for the

Box 1: Collective production of mushrooms

Oyster mushroom is produced by a team of 9 women, led by Leelmuni Soren in Sagbehri village. Mushroom is produced in a hutment of about 500 square feet size.

The first batch is laid in first week of March and every successive batch is laid at an interval of 20 days, till September. Each batch is ready to harvest in 40 days.

A total of 10 batches of 600 bags each are grown. Around 400 kg is harvested in each batch. At a rate of Rs 140 per kg, each batch fetches a total of Rs 63000. The cost of cultivation per batch of 600 bags comes to Rs 25500 (which includes in addition to inputs, the rental value of the tenement, imputed value of members, labour, electricity bills etc.), thus giving a net income of Rs 37500. As a collective enterprise, each member earns Rs.4167. Of this 40% is contributed towards group savings.

Leelmuni Soren is now identified as the local trainer who trains others in Santhalese dialect. She earns Rs 4000 per month by providing trainings.

purpose of training, one community nursery was grown in each village. Nearly all farmers in their respective villages participated in the training programme as well as nursery raising activity. The setting up of community nursery served as their first training in collective agricultural undertaking. In addition to learning to lay and maintain a large common nursery, they also benefitted by using the seedlings for planting crops in their respective fields. By learning new methods, farmers were able to go for off season vegetable growing.

After paddy, communities also learnt to grow seedlings of tomato, brinjal, chillies and cucurbits in plastic trays in open as well as in polytunnel in the off-season. They sold the plants to growers in adjoining areas. This was their first commercial venture. Albeit small, it was an encouraging experience. An escalated income motivated communities to be ready and enthusiastic for further ventures.

Mushroom production

Villagers were well aware about edible mushrooms growing wildly in forests. They used to collect it for home consumption and sell in nearby weekly market (*Guhiajori, Dumka, BadaPalani* and *Karela* markets) at Rs 80 to 100 per kg. However, the idea of cultivating mushrooms was new to them. With NAIP support, they eagerly learnt the skill of growing mushroom and gave it a maiden trial in their houses. The first batch itself found an easy market at their block town markets, *i.e.*, *Dumka, Guhiajori* and *Jamtara*. Mushrooms were sold at Rs 120-140 a kg. From the first experience, they exuded enthusiasm and expressed willingness to scale up.

Consequently, about 700-800 farm women belonging to 10 villages were trained on mushroom cultivation. Day long trainings were carried out in each village. After the training, in the same year (2009-10) about 100-200 women started cultivating mushrooms. After one season only 50 women continued, as most of the farmers who were landless or with marginal holdings, could not afford the inputs needed and had to drop out. These households normally migrated after the rice season in search of wage labour. Around 20-25 families were convinced to stay back and necessary inputs for taking up mushroom farming was provided from the project.

In the beginning, women took up production individually in their homes and also marketed individually. After 1-2 production cycles, they continued to grow individually, but marketed collectively pooling their produce.

Moving towards collective initiative

From 2011 onwards they decided to combine their resources in order to produce mushrooms on a commercial scale. It was felt that expenditure could be minimized by collectivisation, for e.g., expenditure on preparing mushroom substrates obtaining spawn, on maintenance of substrate preparation yards and carrying mushroom to markets and arranging for final sale. Operational costs could be reduced by collectivizing the equipment and labour. In this case, instead of all farmers needing to make a growth chamber, one common chamber was sufficient for use by all the members of the group. Similarly, all of them did not need to maintain a store and bag filling yard, a common facility could be

Mushroom production as an enterprise has enhanced household nutritional security, provided gainful employment and income and arrested migration.

maintained for collective use. This saved space, capital and labour.

By organizing themselves into small (4-5 members) and large groups (16-20 members), often more than one in each village, the communities took up collective production and marketing. The first self help group was formed with the support of NAIP. Later many SHGs were formed to take up collective activities. Each individual was responsible for different activities -substrate preparation using locally available paddy straw; production and marketing. Training was provided on group management too.

NAIP programme supported their endeavor with regular supply of inputs like Spawn, Formaldehyde and Carbendazim(for sterilization of substrates), Master trays, plastic ropes, Polypropylene (PP) bags (for making of mushroom bags). Calcium carbonate was supplied when required. Since the activities were being under taken in thatched and mud houses, they were provided with Polyethylene (PE) sheet for covering the roof.

The average production of a group of 5 members is 40 kg of oyster and milky mushroom. Every partnering household consumed around 20-25% of the produce, while the rest was sold. An account of home consumption by every member was recorded in a note book and was deducted from their monthly dividends. The average annual household consumption of mushroom rose from 16 kg to 36 kg. Earlier, the communities were consuming mushrooms by collecting from the forests, restricted to monsoon season. But now, they are able to consume cultivated varieties, over a longer period of time.

By selling individually, farmers could reach only local markets, where the prices ranged between Rs 100 to 120 per kg. Also, by selling individually, certain expenditures like containers, transportation, imputed value of family labour added up, making it expensive. By pooling the produce and arranging to send it to a larger market, i.e., district markets of Dumka, Jamtara, Sahebganj, they could get better price of Rs 140-160 per kg and could reduce cost on logistics by about 80%. In 2010-11, the groups earned Rs. 1,40,000/- from selling mushroom.

The returns on mushroom sale are deposited in bank accounts of self help groups and used as revolving fund. They also lend some amount as need based loans to the members. Presently, the group procures 100 spawn packets, sufficient for preparing 300 cases per month. With market prices steadily increasing, the group is able to receive good returns. On an average, the group earns an income of Rs. 30,000/- per month.

Growing into a sustainable enterprise

Mushroom production as an enterprise has enhanced household nutritional security, provided gainful employment with income and arrested migration. With collective production and marketing, the tribal communities could experience multiple benefits, making it a win-win proposition for all.

NAIP played a pivotal role of inspiring these women farmers by exposure visits, demonstration programmes, hands-on trainings, providing backstopping support when they faced problems. After the closure of National Agriculture Innovation Project in 2011, the capacity building, hand holding and backstopping continued till 2014-2015. Some need based input support continued up to 2016-2017. Presently, the production is totally self dependent.

Besides earning good returns, the group members also transformed their working environment. They consolidated their infrastructure, renovated their substrate packing shade and storage facilities in the mushroom growing chambers. From the money earned from sale of mushroom, the SHGs have bought chaff-cutters to cut paddy straw. Today, they have ten chaff cutters in ten villages.

From being individual growers growing mushroom in their house and selling it in the local *haat*, these communities have grown into formal self help groups. Improved dwellings with concrete terraces and television in some homes are just a few examples of their increasing prosperity.

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Inch of land with bunch of enterprises

P Anithakumari, Merin Babu and S Indhuja

Small is beautiful and productive when it is diversified and nurtured to meet the nutritional and economic needs of the family. Small holdings challenge the farm families to innovate, to experiment, to recycle and reduce the cultivation costs. A small diversified homestead farm, successfully managed by a woman farmer is truly inspiring.

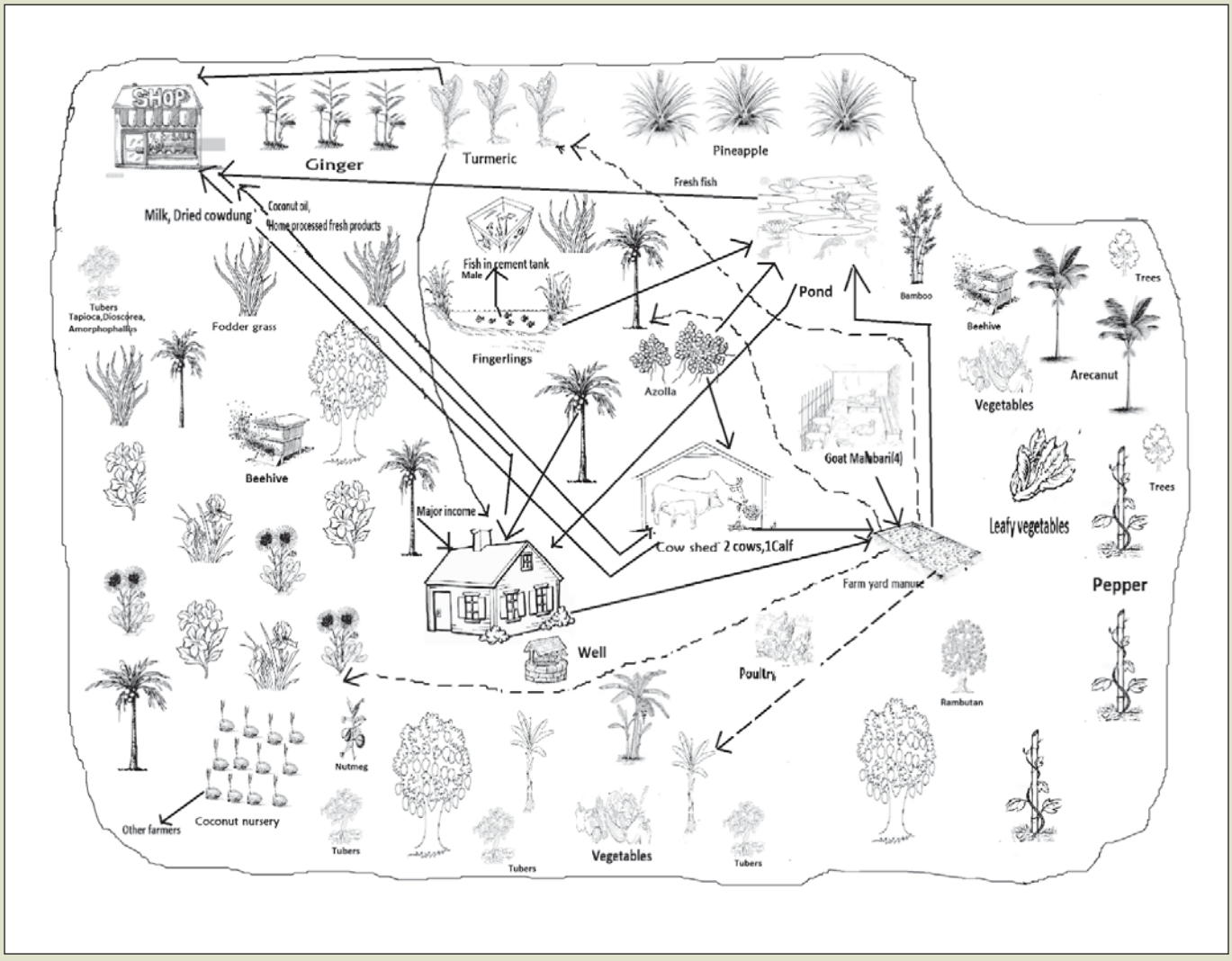
Indira grows pepper vine in coconut and arecanut plantations

Doubling farm income by 2020 is one of the most targeted goals for agriculture research and development sector. All India data reveals that more than 80% of the farmers in India are small and marginal. It is also an indication, that major portion of the agriculture production in India are from these small farms. The 'success mantra' of the small farms of Kerala state with an average land holding size of 0.2 hectare is the multiple diversity models achieved through innovations of the farming community evolved over time.

Indian Council of Agricultural Research- Central Plantation Crops Research Institute (ICAR-CPCRI) has been implementing several outreach and participatory extension research programme among farming community. Under its 'Farmers FIRST' programme

Returns from livestock adds to the family income

Fig.1. Pictorial representation of the small farm for Dietary diversity and multiple income



Box 1: Small and diversified homestead farms- Some salient features

- The land holding size of small farms ranged from 0.2 to 0.4 hectare. The multiple components were blended for the maximum utilization of resources including the mobility and availability of time of farm family members.
- Cafeteria of crops such as coconut, fruit crops, fodder, tubers, vegetables, spices etc., and inclusion of diversified farm enterprises of varying unit sizes of livestock, small ruminants, poultry and backyard ponds, enabled resource recycling and are managed mostly with family labour.
- Farming practices are adopted in rainfed conditions. Soil and water conservation measures such as opening of coconut basins before monsoons, mulching with farm residues and recycling of animal and farm waste like cowdung, urine and dry leaves, are adopted.
- The role of family members enhanced the efficiency through better time management, mobility optimization, networking with society for marketing farm produce and for obtaining critical inputs.
- Involvement and participation of farmers (family) was the key point of sustainability in all the small farms. Harvesting and marketing is done on a daily basis so that the 'food mile' is zero.
- The technology options included carefully chosen traditional knowledge and skills like usage of botanical pesticides and organic manure for vegetables, tubers, banana, coconut and livestock.
- The scale and size of each component in the farm, was found to be decided by the farm family, to manage the output, to distribute income and sustain farming successfully through maximum use/ recycling of internal inputs from other enterprises.
- The income sources were distributed in small farms to get daily income (egg, milk, sale of home processed products, bush jasmine etc), fixed interval income (coconut harvest in once in 45 days) and seasonal income from crops like nutmeg, pepper and bonus income from timber trees, sale of animals etc.

(FFP), case studies of small farmers in Pathiyoor panchayath, Alappuzha district were documented. The salient characteristics of small farms were found to be blending diversity of innovations in crops and enterprises.(see Box 1)

Diversified homestead farms

Homestead farming in Kerala is a time tested model, matured through generations and experiential learning. '*Purayida Krishi'* in Malayalam language, literally means 'farming in the space around home for family'. Hence it could be termed as 'small farms by the farm family for the farm family' sticking to the natural and ecological norms.

Mrs. Indira, Kandathiltharayil, Pathiyoor East, Alappuzha is an enterprising model woman farmer of the Farmer FIRST program (FFP) embracing enterprise diversity in integrated farming system (IFS). The small farm is of 0.28 ha area and managed by Mrs. Indira, her husband and son. The farm is small and has two milch animals and one calf, five goats of Malabari breed, 80 poultry birds of kadaknath and local breeds, fishpond of 600 m^2 area, along with coconut based cropping system. Also there are timber trees on borders, 73 pepper wines trailed on the trees, arecanut and few coconut palms, *seemakonna (Glyricidia Sp.)/vatta* (*Macaranga peltata*) which also served as green manure crops.

Indira gets premium price for farm fresh products

Azolla grown on farm is used as supplemental feed to livestock

Mr. Midhun, her son is an engineering graduate and has set an example with his contribution to this small farm. He started fish and fingerlings farming in three cement tanks of 7 X 4X 1 m size, besides the homestead pond. He is happy that the homestead farm gives luxuries like pure and plenty air, cool micro climate and fresh foods with 'zero food mile'.

Resource recycling

About 68 species of plants and breeds have been documented in this small farm. The traditional wisdom of ecological engineering in homesteads with floral plants and intercrops is reflected in the natural presence of two stingless bee colonies in the plot. Resource recycling has reduced use of external inputs up to 60 percent. The fodder and natural grasses are fed to livestock while farm yard manure and urine are used for the crops. Azolla, harvested once in three days, is used as feed for poultry, goat, fish and livestock. It is also applied to vegetable crops, occasionally. Green manure crops provide micro and macro nutrients. The kitchen wastes and ash are applied to crops. Coconut residues serve as mulching material and enriches the soil.

Reaping multiple benefits

The family is reaping multiple benefits through their homestead gardens. The incidence of pests and diseases are very low compared to monocropped plots. Farm produces traditional breeds and crops and fetch premium price of 20-30 percent more compared to similar marketed products. Farm products are sold through an outlet on the farm itself. Milk is supplied to milk farmers' cooperative society. Milk and eggs of local breeds fetch higher price. Home based value addition products like

curd, buttermilk provide regular daily income to the tune of Rs.200 to 300. Income from coconuts is received once in two months. Around 4.2 lakh rupees of income is earned annually by the family.

Diverse homestead farm also provides healthy fresh foods to the household. Most of the home food needs are met from the homestead itself. Sesamum and horsegram are grown seasonally. Besides these, diverse foods like roots and tubers (amorphophallus, diascorea, colocasia, yam, cassava), green leafy vegetables (moringa, amaranthus, traditional miscellaneous leaves), fruits (banana, pineapple, mango, jack, sapotta, rambutan), vegetables, fresh water fish, milk and milk products, eggs, etc., are providing a healthy nutrition to the family. Indira says, *"Our farm is the 'akshaya pathram' of fresh nutrition for a healthy family and green income with plenty of happiness and love from the living beings in the farm." "The most important experience from this integrated farm is the risk alleviation during price fluctuation and climate change",* says her husband Mr. Ravi.

Indira besides getting food and steady income from her farm opines that she is also being respected and has gained recognition from family members and her community. She was also recognized for setting an emulative model of integrated farming system, by Krishibhavan. She was also invited to share her farming model which has the feasibility for doubling farm income in a National level workshop organized at NAARM, Hyderabad - a proud moment for her as a women farmer.

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Fingerlings produced in fish tank in the farm

Diverse farming

Need of the hour for small farmers

M N Kulkarni and T Suresh

Effects of climate change is making the lives of small and marginal farmers more difficult. Livelihoods of the small and marginal farmers are at a greater risk. Under such circumstances, diversified farming seems to be the only hope to sustain in farming. Upparahalli village leads by example.

Upparahalli, in Chikkanayakanahalli taluk of Tumkur district is a small village with 140 households. Agriculture is the primary livelihood of all the families. 80% belong to marginal and 20% to small farmer category. Though coconut is the main commercial crop in the taluk, farmers in this village have resorted to vegetable cultivation ever since the coconut has started to suffer from various pests and diseases.

Vegetable cultivation

In Upparahalli, over 50 to 60 farmers are involved in the cultivation of vegetables such as tomato, lady's finger, ridge gourd, snake gourd, beans, leafy vegetables and chillies. Depending on the land holding, farmers are growing vegetables in five guntas to half acre. Those having assured water have extended it to one acre too.

Sri. Ningaiah shares his experience with tree based farming with the visitors to his farm

"During rainy season, we grow vegetables in uplands and during summer, in the coconut orchards. Water required for cultivation of vegetables in coconut orchards is comparatively less owing to conjunctive use of water. With the available resources, we do get vegetables and manage coconut orchards", explains Sri. Rangaiah, a vegetable grower.

Farmers having assured water, usually grow four to five types of vegetables- tomato, beans, snake gourd, bitter gourd, ridge gourd etc. With more diversity, the risk is less. Also, farmers adopt organic farming practices. They were exposed to ecofriendly ways of cultivation when the Department of Agriculture, Government of Karnataka implemented an organic farming project in the village during 2011 to 2013. Farmers apply vermicompost and have reduced application of chemical fertilizers by 50%. Many farmers apply botanical preparations for management of pests and diseases. Consequently, farmers on an average, are able to save Rs. 2500 to 3000, which they were hitherto spending on chemical fertilisers and pesticides.

Rangaiah is a small farmer. He has been growing finger millet, cow pea, red gram and green gram for home consumption. He was the one who started cultivating vegetables a few years back. Other farmers saw the earnings of Ranganna and slowly started to follow him.

Rangaiah practices integrated nutrient management for vegetables. He applies FYM in large quantities. Vermicompost is mixed with irrigation water and applied. He has adopted drip system too. He also prepares liquid fertilizer by mixing one litre of cattle urine with 10 litres water and sprays at regular intervals.

This year he has grown snake gourd in 5 guntas, bitter gourd in 2 guntas, chilly in 2 guntas and field beans in 10 guntas. Snake gourd has started yielding and he has sold one ton and earned 20000 in one month. Other crops are yet to yield. During the previous year, Rangaiah's net earnings from vegetables was Rs.60000 from snake gourd, Rs.24000 from bitter gourd and Rs.45000 from Field beans. Apart from this, he also earns from crops and coconut orchards.

Farmers like Shivanna are earning better incomes with vegetable cultivation

Shri. Rangaiah applies botanical liquid fertilisers prepared on his farm

Vegetables are sold in Huliyar, CN.Halli and KB Cross towns which are nearer to this village. Earlier, they used to transport through private buses. Now, transport facility is available in Upparahalli itself. Farmers also transport vegetables through autos. They go to the market individually and sell the items to middlemen. Of all the items, only tomato is graded and sold. *"We get Rs. 50 additional per box for graded tomato"* tells Rangaiah. However, field beans are sold collectively. During the season, one ton is consumed per day in Huliyar market. The vegetables from Upparahalli look attractive and are in demand and there is less bargaining from consumers. On an average, each grower earns Rs. 4000 to 5000 per week. Average expenditure is Rs. 1500 towards harvesting, transport etc.

"All the families in our village own land ranging from two to five acres. In the uplands, finger millet is grown. Green gram, horse gram, red gram etc., are grown as mixed crops along with finger millet. Under normal rainfall conditions, we get 6 to 8 quintals finger millet per acre and pulses enough for home consumption. Our village is known for good quality vegetables" explains Thimmaiah who is cultivating vegetables and food crops.

Integrating dairy

It is interesting to note that majority of the vegetable growers do rear 2 to 3 cattle. Also, about 90 farmers were supported partially by the project for purchase of dairy animals. BAIF- Institute for Sustainable Livelihoods and Development, Tiptur, has facilitated the community for adopting organic farming practices. This has resulted in increased milk production. These farmers sell around 8 to 10 liters milk per day. A private milk collection center has been set up in Upparahalli village.

Recycling resources

Farmers recycle resources from one enterprise to the other. Fodder sorghum, sunhemp and finger millet provide fodder for the cattle, in turn, dung is recycled back to the fields. The dung is converted into compost and applied in large quantities to vegetable fields. Silt application is also practiced by few farmers. This has helped them to minimize the application of chemical fertilizers. Only milk goes out of the system. Hence one can see a complete cycle where in one enterprise provides inputs for the other and vice versa.

Conclusion

Of the 140 households in Upparahalli village, 50-60 farm families have diversified enterprises adding to the nutrition and income for the family. Diversifying farming with enterprises like vegetable cultivation and dairy has resulted in assured income for the farmers. In the changing scenario of climate change, diversified farming has helped to spread risks while sustaining the income and broadening the livelihood base.

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NEW BOOKS

More people, more food... worse water? - Water Pollution from Agriculture: a global review

FAO and IWMI, 2018, FAO, Rome, 225 pages, ISBN: 978-92-5-130729-8

Current patterns of agricultural expansion and intensification are bringing unprecedented environmental externalities, including impacts on water quality. While water pollution is slowly starting to receive the attention it deserves, the contribution of agriculture to this problem has not yet received sufficient consideration.

We need a much better understanding of the causes and effects of agricultural water pollution as well as effective means to prevent and remedy the problem. In the existing literature, information on water pollution from agriculture is highly dispersed. This report is a comprehensive review and covers different agricultural sectors (including crops, livestock and aquaculture), and examines the drivers of water pollution in these sectors as well as the resulting pressures and changes in water bodies, the associated impacts on human health and the environment, and the responses needed to prevent pollution and mitigate its risks.

Food Security, Gender and Resilience
Improving Smallholder and Subsistence Farming

Leigh Brownhill, Esther Njuguna, Kimberly L. Bothi, Bernard Pelletier, Lutta Muhammad, Gordon M. Hickey (Eds.), *2018, Routledge*, 176 pages, £36.99, ISBN: 9781138588929

Through the integration of gender analysis into resilience thinking, this book shares field-based research insights from a collaborative, integrated project aimed at improving food security in subsistence and smallholder agricultural systems. The scope of the book is both local and multi-scalar. The gendered resilience framework, illustrated here with detailed case studies from semi-arid Kenya, is shown to be suitable for use in analysis in other geographic regions and across disciplines. The book examines the importance of gender equity to the strengthening of socio-ecological resilience. Case studies reflect multidisciplinary perspectives and focus on a range of issues, from microfinance to informal seed systems.

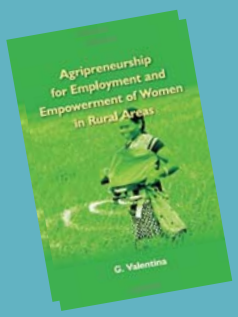
The book's gender perspective also incorporates consideration of age or generational relations and cultural dimensions in order to embrace the complexity of existing socio-economic realities in rural farming communities. The issue of succession of farmland has become a general concern, both to farmers and to researchers focused on building resilient farming systems. Building resilience here is shown to involve strengthening households' and communities' overall livelihood capabilities in the face of ongoing climate change, global market volatility and political instability.

Agro ecology for Food Security and Nutrition
Proceedings of the International Symposium on Agroecology in China, 29-31 August 2016

FAO and CAAS, *2018, FAO, Rome*, 225 pages, ISBN: 978-92-5-130733-5

The Proceedings book includes the contributions from agreocology experts and practitioners that took part as speakers in the International Symposium on Agroecology for Sustainable Agriculture and Food Systems in China held Kunming, Yunnan, China from 29-31 August 2016. The volume has been prepared in order to collect and disseminate further the knowledge that has emerged from the Symposium. It offers evidence for and examples of agroecology as a means of increasing agricultural production through an ecosystem-based approach in China and other countries.

SOURCES



Agripreneurship for Employment and Empowerment of Women in Rural Areas

G. Valentina, *2015, GenNext Publication*, ISBN: 9789380222608, 9380222602

Traditionally women in agriculture are confined to activities like weeding, preparation of agriculture fields, application of green and farmyard manure, crop management, planting, harvesting and post-harvest operations. Onset of liberalisation opened avenues for women's participation in agricultural labour force giving rise to Feminization of Agriculture and increase in rural female work participation rate. Consequent impact has been the creation of women entrepreneurs. Today they comprise about 10 percent of total entrepreneurs in India and 51% in forest-based small-scale enterprises playing a key role to transform rural livelihoods. They also face many challenges like mushrooming multinational companies, patriarchy, illiteracy, dependency on male members, economically not self-dependent, dependency on intermediaries, marketing, sales and non cooperation of financial institutions. This book provides a platform for women entrepreneurs to share their experiences, discern role of technology in promoting employment and empowerment and debate on initiatives made by government in promoting Agripreneurship in women.

Entrepreneurship in Farming

David Kahan, 2013, FAO, ISBN: 978-92-5-107547-0

There are two parts to entrepreneurship. The first is the managerial skills needed to start and run a profitable farm business. The second is 'entrepreneurial spirit'. Both are important. Managerial skills can be taught, but an entrepreneurial spirit cannot be taught. Many farmers are already excellent managers and many also have some of the spirit of an entrepreneur. As 'price takers' many farmers have developed outstanding abilities to make the most of their resources. But being 'price takers' suggests that these farmers are not innovative, do not take risks and lack the drive that is usually associated with an entrepreneurial spirit.

The purpose of this guide is to provide a better understanding of the concept and practice of entrepreneurship. With this understanding it is hoped that extension workers will be better able to help farmers develop the skills and spirit of an entrepreneur. It is part of a series of booklets on farm business management designed to help extension workers support farmers.

What is presented in this guide can be applied to people who want to start a farm business for the first time and to farmers who are already running a farm business. In every country, both situations occur.

Many existing farmers want to make changes to their farming systems by introducing high value enterprises directed to the market. There are also many newcomers (young and old, male and female) entering farming who are starting with their first farming enterprise. This guide can help extension workers help all of these potential farmer-entrepreneurs.

Agri-entrepreneurs of Bihar

Aditya, Sohane, R.K., Jaiswal, U.S., (eds.),2015, Directorate of Extension Education, Bihar Agricultural University, Sabour.

View the document at http://krishikosh.egranth.ac.in/handle/1/63867

The book "Agri-entrepreneurs of Bihar" is a collection of successful cases of farmers who have transformed agriculture into a mega-entrepreneurial activity in Bihar. The cases are from all the twenty Krishi Vigyan Kendras located in different districts of Bihar under the jurisdiction of Bihar Agricultural University, Sabour. The cases in several domains of agriculture and allied disciplines underline the importance of agriculture in the state which has the capability to bring about a change in the entrepreneurial potential of the state.

Ecological farming is the way forward

Indrani is a small farmer owning one acre of rainfed land and lives in Mangarai village of Pennagaram block in Tamil Nadu. Her husband is a government employee and hence farming took a backseat. Even though she grew occasionally groundnut and paddy (tank-fed), she wasn't very keen on adopting good farming practices. She relied on the local input seller and applied chemicals to the crops, based on the seller's advice. She never even knew that alternatives to chemical farming, existed.

Indrani is not only a member of SHG group but also manages four such groups. These groups were formed by MYRADA, an NGO, around 12 years back. Being an animator cum director, Indrani participates in MYRADA's board of directors meeting every month. In one such meeting, MYRADA-manager shared the outcomes of a Farmer Field School being conducted by AMEF, an NGO working in a neighbouring village. Indrani realized that she was not earning anything from the way she did farming. She, for the first time learnt that there were eco-friendly ways of doing farming. Out of growing interest, she interacted with the women, who had been trained through the Farmer Field Schools.

In 2015, when AME entered her village to help farmers to adopt ecological ways of farming, Indrani was the one who proactively came forward and organized the FFS group. She participated in all the FFS sessions and enriched her knowledge on ecological agriculture. She gradually gained more confidence in taking appropriate decisions to address problems on her farm. She started using botanical pesticides. She installed yellow sticky traps to attract sucking pests. She raised sunhemp prior to groundnut to control weeds. She replaced chemical fertilisers with biofertilisers and observed that her costs were low. *"Now I prepare NSKE, botanical pesticides and yellow sticky traps on my own. I have stopped using chemical pesticides totally. Previously, I used to spend Rs.8000-10000 per acre on purchase of fertilizers, pesticides, weeding charges etc.. but now I spend only around Rs. 4000/-. By adopting alternative methods, I could save an amount of Rs.3000-4000/-per acre"*, says Indrani.

Mrs. Indrani adopts ecological practices on her farm

In fact, adoption of ecological practices saved her crop in 2016, when there was acute drought. Indrani having understood the importance of soil moisture conservation adopted several practices - in-situ ploughing of sunhemp was done to improve organic matter content in the soil, bioenriched FYM was applied, adopted across the slope ploughing to enhance the water holding capacity. *"When, other field crops of groundnut suffered at critical crop growth phases like flowering, peg formation, pod formation due to moisture stress, my groundnut field could survive and I could harvest 50 to 60% of groundnut yield. The crop loss was only to the extent of 40 to 50%, while it was total yield loss for other farmers"*, says Indrani.

Indrani is presently a happy farmer cultivating crops like groundnut, Samai, Ragi etc., following ecological practices. Having gained from eco-friendly ways of cultivation, Indrani has been instrumental in spreading it by educating the members of the three SHGs. She also shares her experiences in gramasabha and panchayat level meetings. *"Our village's organic and healthy environment can be regained if ecological agriculture is followed in all types of lands (dry, wet and garden)"*, says Indrani, confidently.

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Sustainability through diversified farming

Amandeep Singh and Gurpreet Kour

Diversified farming not only generates multiple returns but also keeps the costs low, when integrated. Sukhjeet shows that integrated farming not only provides food and income security but also keeps him employed all through the year - a model worth emulating.

Sukhjeet Singh is an educated youth belonging to a small hamlet in rural Punjab called *Biroke Kalan* in Mansa district in Punjab. After a brief stint in his employment, he wanted to return to farming and start his own farm based enterprise. During his childhood, Sukhjeet has seen his father S. Bhola Singh rearing pigs for meeting nutritional needs of the family and was therefore not new to farming.

The beginning of diversification

Sukhjeet has been growing food and fodder on his land which meets the needs of his family and the dairy animals. He cultivates two to three crops every year on his land.

In 2015, Sukhjeet started goat, pig and fish farming, along with his friends, Randhir Singh and Chandra Muni Sukhjeet, as partners. Before starting the enterprise Sukhjeet got trained for 5 days on goat farming and 7 days on pig farming from Krishi Vigyan Kendra (KVK),

Sukhjeet raises 10000 fingerlings in a fish pond spread across two acres of land

Mansa. He was also trained on fish farming by Guru Angad Veterinary & Animal Sciences University (GADVASU).

Sukhjeet constructed a fish pond on 2 acres. He set up a goat farm on 0.125 acres and pig farm on 0.125 acres of his land. In the beginning of 2018, he further diversified his farming business by constructing a poultry farm on scientific lines with a capacity of 7500 birds and started rearing broilers. Before starting his broiler farm, he got trained from KVK, Mansa.

Integration

The livestock and fish production units are on a small scale, but the farms are interdependent on each other. Waste from one farm is used as a resource for the other. The goat and pig feaces are washed into the fish pond along with the dung from the dairy animals. He does not use any feed for the fishes and the wastes from the animal sheds serve as both feed for fishes and fertilizer for the fish pond. Agriculture waste is fed to the goats and kitchen waste is fed to the pigs. All these adjustments have helped him to curtail costs of animal feeding and enhanced his farm economics.

Production and Sustainability

Being educated and a skilled farmer, Sukhjeet maintains his farms systematically. He presently has about 10,000 fingerlings in his pond and sells fish once a year. He has 9 pregnant sows and 2 boars along with 12 piglets in his pig farm belonging to Large White Yorkshire breed. He sells pregnant sows and piglets from his farm at regular intervals. Presently, there are 65 does and 5 bucks. The goat breeds which he rears are *Totapari, Beetal, Sirohi, Barbari* and some other local breeds. He sells pregnant does and kids from his goat farm.

Recycling resources among various enterprises has curtailed the costs of animal feeding and has enhanced the farm economics.

His monthly income from goat, pig and fish farm is estimated to Rs. 80,000/-. Since inception of his poultry farm, he has marketed four lots of broiler chicken and has earned Rs. 60,000/- per lot. Not only the integrated farming has helped him earn healthy sums of profit by cutting costs of farming but also entailed year round employment for him.

Feed costs are reduced by feeding goats with crop wastes

Newly arrived chicks in poultry farm

Learning and connecting with farmers

Sukhjeet is closely associated with the farmers of his region. He advises and motivates new farmers for undertaking the livestock business and helps with backward and forward linkages. Sukhjeet has developed contacts with Subject Matter Specialists of KVK, Scientists of PAU and GADVASU and approaches them whenever there is a problem. After troubleshooting his problems, he shares his experience with other farmers.

Sukhjeet is very active on social media too. He uses social media for sharing knowledge and experience on diverse farm enterprises. As he is educated, he keeps reading livestock related articles from magazines, websites and mobile apps and shares with others. He uses WhatsApp and Facebook groups to promote livestock farming, for linking different stakeholders, and for getting information on advanced practices from peers. Sukhjeet runs social media groups on fish farming, goat farming, pig farming and poultry farming.

Future Plans

Sukhjeet plans to expand his farms by constructing new farms and renovating the old ones. He has plans to bid for fish farm owned by his *Panchayat* in auction and start farming there as well. Further, he wishes to expand his fish pond to 4 acres as he says that minimal input is required for fish farming and the business is quite profitable.

Conclusion

Sukhjeet is a dedicated individual and one of the most progressive farmers of his region. He has not only diversified his farming activities but also integrated them in such a way that the waste generated by one farm is serving as a resource to the other farm, thus keeping the costs of production low. Further, integration of fishery, goatery, piggery and poultry has enabled food security as well as year round employment.

Sukhjeet is also a member of progressive farmers' associations. He serves as a perfect example for diversified and sustainable farming. He has not only created livelihood for himself but also provides employment to others from his village. He serves as a role model for unemployed youth of the country to take up integrated farming for sustainable livelihoods.

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Call for Articles

Agroecological innovations

Vol. 20 No. 4, December 2018

Agroecology is highly knowledge-intensive, and is based on techniques that are not delivered top-down but developed on the basis of farmers' knowledge and experimentation. Agroecology depends on context-specific knowledge.

Farmers are not only producers accepting and adopting technology. They are also innovators, building on their knowledge, when the right conditions exist. Agroecological innovations leads to local alternatives that are based on indigenous and traditional knowledge and on the practices of community, tested and proven over time. However, farmers need space, time and resources to experiment, test and validate the small innovations that they are making to bring about positive change to their farming systems. Supportive policies and adequate funding for public participatory research on agroecology is needed to support farmers and their innovations.

There are many innovative farmers practising low external input agriculture. Some are constantly innovating and serve as role models. There are many more who are silently innovating on their farms. There are also NGOs and institutions that are encouraging farmers to experiment and innovate through participatory processes. On the other hand, there are individuals and institutions that are developing innovative tools and practices that could be of use to small farmers. In such a scenario, how should we support farmer innovators? How should we create a social and economically conducive environment for farmer innovation and farmer- researcher collaboration? How to scale up farmer innovation? In the December 2018 issue of LEISA India we would like to include interesting innovations, by farmers, institutions or individuals and would also like to look at the policies and approaches that support such innovations.

Articles for the December 2018 issue of LEISA India should be sent to the editors before 10th November 2018.
Email: leisaindia@yahoo.co.in

This testing kit can read your soil in seconds

The overuse of chemical fertilisers and shunning the age-old organic soil revival practices and appropriate crop rotation are taking a toll on the soil fertility in the state, posing a major challenge for farmers. The situation worsens when there are no adequate facilities to test the soil before cropping at every season.

To tackle the issue, an innovative soil-testing kit was introduced in the startups meet of Global Impact Challenge 2018 organised by Kerala Startup Mission in Thiruvananthapuram. The tool was presented before a panel by Karnataka-based EasyKrishi, a young enterprise that uses digital interventions with an aim to change agricultural practices from 'reactive mode to proactive mode'. The kit will help to determine the current condition of soil, providing the data on PH value and NPK ratio. It will help to minimise fertilizer expenditure, avoid over fertilisation and soil degradation. Further, the app-based tool will tell the customers the level of pesticide residue in vegetables one buys from the market in a couple of seconds.

The kit can be used by downloading the app in the smartphone of the farmer. The kit can be fixed on the rear side of the smartphone where the camera flash is situated. The farmer who puts a small quantity of soil collected from his farm inside the kit, in which reagents to test the soil has been filled, will get an instant reading upon pressing the button of the camera.

These kits are handy, easy to use and yield results without any dependency on complicated procedures and need for specialised machines. If the farm trial of the soil-testing kit is trustworthy, it can revolutionise the farm sector as the importance of soil moisture, soil texture and of course soil composition (chemistry) determines what crops can grow in particular regions, and how much yield the fields will produce, say, experts.

Source:http://www.newindianexpress.com/cities/thiruvananthapuram/2018/jul/16/this-testing-kit-can-read-your-soil-in-seconds-1843808.html

Andhra Pradesh to become India's first Zero Budget Natural Farming state

The Government of Andhra Pradesh has launched a scale-out plan to transition 6 million farms/farmers cultivating 8 million hectares of land from conventional synthetic chemical agriculture to Zero-Budget Natural Farming (ZBNF) by 2024, making Andhra Pradesh India's first 100 per cent natural farming state.

The programme is a contribution towards the UN Sustainable Development Goals, focusing on 'No Poverty', 'Clean Water and Sanitation', 'Responsible Consumption and Production', and 'Life on Land'. It is led by Rythu Sadhikara Samstha (RySS) – a not-for-profit established by the Government to implement the ZBNF programme - and supported by the Sustainable India Finance Facility (SIFF) – an innovative partnership between UN Environment, BNP Paribas, and the World Agroforestry Centre.

The official launch of the ZBNF scale-out programme marked an unprecedented commitment by the state to promote the scale-out of climate-resilient, regenerative agriculture in a broader effort to transform and protect local food systems and long-term well-being of farmers.

As both a social and environmental programme, it aims to ensure that farming – particularly smallholder farming – is economically viable by enhancing farm biodiversity and ecosystem services. It reduces farmers' costs through eliminating external inputs and using in-situ resources to rejuvenate soils, whilst simultaneously increasing incomes, and restoring ecosystem health through diverse, multi-layered cropping systems.

Considering its impressive scale, an effective shift to a 100% natural farming state with 8 million hectares free of chemical contamination will achieve transformative impacts in India. In addition, it will provide a blueprint

for an inclusive agricultural model, which takes into account diversity of people along with agro-climatic conditions and can be adapted to varying global contexts to reduce vulnerabilities to climate change. Moreover, as 14 out of the 17 Sustainable Development Goals are dependent on the status of natural resources, the health of communities, access to secure nutrition, and empowerment of women, ZBNF constitutes an effective cross-sectoral strategy for achieving SDGs targets.

Recognizing its transformative potential, the Sustainable India Finance Facility will facilitate the ZBNF scale-out process, targeting investments amounting to US$ 2.3 billion over the next 6 years.

Source: https://www.unenvironment.org/news-and-stories/press-release/andhra-pradesh-become-indias-first-zero-budget-natural-farming-state

Earth has more trees now than 35 years ago

Despite ongoing deforestation, fires, drought-induced die-offs, and insect outbreaks, the world's tree cover actually increased by 2.24 million square kilometers – an area the size of Texas and Alaska combined – over the past 35 years, finds a paper published in the journal *Nature*. But the research also confirms large-scale loss of the planet's most biodiverse ecosystems, especially tropical forests. The study, led by Xiao-Peng Song and Matthew Hansen of the University of Maryland, is based on analysis of satellite data from 1982 to 2016.

Overall, the study found that tree cover loss in the tropics was outweighed by tree cover gain in subtropical, temperate, boreal, and polar regions. Tree cover gain is being driven by agricultural abandonment in parts of Europe, Asia, and North America; warming temperatures that are enabling forests to move poleward; and China's massive-tree planting program. Tree cover is also increasing globally in montane areas.

The biggest gains in tree cover occurred in temperate continental forest, boreal coniferous forest, subtropical humid forest. Russia, China, and the United States experienced the largest increase in tree cover among countries during the period. By contrast, the tropics saw substantial losses in tree cover, led by tropical moist deciduous forest, tropical rainforest, and tropical dry forest. Tropical dry forest had the highest rate of loss over the 35 years at 15 percent. Brazil led the world by far in tree cover loss, losing 399,000 kilometers.

The study estimates gross tree canopy loss globally at 1.33 million square kilometers, or 4.2 percent of 1982 tree cover. But adding in gains, the planet's total area of tree cover increased by 2.24 million square kilometers, or 7.1 percent, from 31 million to 33 million square kilometers. The study concludes that 60 percent of all change during the study period were associated with human activities. Attribution varied across biomes, with direct human impact associated for 70 percent of tree canopy loss (e.g. deforestation), but only 36 percent of bare ground gain (e.g. tundra being colonized by poleward migrating vegetation as temperatures climb).

Beyond driving tree cover loss in the tropics, the footprint of agriculture shows up in other parts of the data, notably the replacement of bare ground cover with short vegetation cover.

India also ranked second in short vegetation gain after Brazil. While the short vegetation gain in Brazil is mainly due to the expansion of agricultural frontiers into natural ecosystems, short vegetation gain in India is primarily due to intensification of existing agricultural lands – a continuation of the 'Green Revolution'. Bare earth is also declining in deserts, mountainous areas, and tundra, indicating the influence of climate change, which is creating conditions that support the growth of grasses, shrubs, and trees. Those shifts are contributing to an overall greening trend, whereby bare ground cover declined by 3.1 percent since 1982.

That "greening" however masks the ecological impacts of replacing diverse natural landscapes with monoculture crops. So while Earth may presently have more trees than 35 years ago, the study confirms that some of its most productive and biodiverse biomes – especially tropical forests and savannas – are significantly more damaged and degraded, reducing their resilience and capacity to afford ecosystem services.

https://news.mongabay.com/2018/08/earth-has-more-trees-now-than-35-years-ago/

Group Enterprises

A way to enhance small farmer livelihoods

H R Mallesh and T Parthasarathy

Maize is a popular crop among farmers, especially small holders in Karnataka. By coming together as a group, the maize growers in Chikkayemmiganuru village established a collective enterprise and gained better control over the price. By recycling empty cobs as fuel, the group has shown its sensitivity towards environment, while earning income out of crop waste.

In Chikkayemmiganuru village of Holalkere taluk in Chitradurga district, nearly 80% of 840 families cultivate maize under rainfed conditions. Small farmers in this village prefer maize over other crops mainly because it can be easily cultivated as a rain fed crop and pest-disease incidence is less, so the cost of cultivation is minimal. Normally, farmers can expect grain yield of 60 to 75 quintals per ha which can result in a moderate profit of around Rs.15,000, with lesser risk compared to other crops. Different food items in the local diet like Upma, Dosa, Roti, Vermicelli etc., are made from maize. It is also used in making poultry feed and cattle feed. The crop residue from maize is high and is used to increase the organic matter content of the soil. The crop residue is also used as fodder for cattle. The empty cobs (after removal of grains) have good heat potential and can be used for fuel purposes. However, farmers consider the cobs as waste and give it at throw away prices to local traders or burn them in the fields itself.

In May 2017, Myrada Green College (MGC) conducted a training programme for 30 farmers from this village on improved cultivation practices in Maize. MGC is a skill

Briquettes, a greener alternative for fossil fuels is prepared from agri-waste

Farmers group manages the operation and maintenance of maize thresher

building institution aimed at developing agriculture-based enterprises. It was established in 2016 by Myrada in partnership with Welthungerhilfe and supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and German Federal Ministry of Economic Cooperation and Development (BMZ) under the Green Innovation Centre programme. Agri-business promotion Centre (ABPC) is a unit within the MGC which supports enterprises formed by Green College Trainees.

The trained farmers were organized into a maize growers group called *"Samrudhi Mekke Jola Belegarara Sangha"*. The group meets on fifth of every month to discuss their experiences of putting into practice the techniques learnt during training and other issues related to farming. The members save Rs.50 to 100 every month and till date have savings of Rs.19,520/- deposited in their bank account.

Thresher cost Rs. 88,000.00 (Purchased under subsidy) Total cost of the thresher is Rs. 188,000.00

	Expenditure				Income			
Sl. No.	**Particulars**	**Unit**	**Unit rate**	**Total amount**	**Particulars**	**Unit**	**Unit rate**	**Total amount**
1	Diesel cost (Litres)	150	66.00	9,900.00	Maize threshed (Quintal)	2881	50.00	144,050.00
2	Oil cost (Litres)	15	110.00	1650.00				
3	Service cost	2	1,300.00	2,600.00				
4	Labour	45% of total earning		57,000.00				
5	Amount paid to group (FIG)			36,000.00				
	Total			**107,770.00**	**Total**			**144.050.00**
			Profit to the operator					**36,280.00**

Details of the enterprise are given below:

Sl. #	Empty maize cobs procured	Price in Rs./tonne	Total amount (Rs.)	Remarks
1.	5.5 tonnes	2400.00	13,200.00	1 Truck
2.	6.2 tonnes	2400.00	14,880.00	1 Truck
3.	6.5 tonnes	2500.00	16,250.00	1 Truck
4.	6.00 tonnes	2500.00	15,000.00	1 Truck
	Total		**59,330.00**	

Expenditure details - 1st truck

Sl.#	Particulars	Quantity	Exp. Details (Rs.)	Remarks
1.	Cost of empty cobs	24.2 tonnes	17,450.00	Lump sum price purchased from farmers
2.	Transportation	4 trip	26000.00	
3.	Labour cost	19	11500.00	Loading/ unloading
	Total		**54,950.00**	
	Cobs sold to GAF	–	Rs.59,330	
	Expenditure details	–	Rs.54,950	
	Net profit	**–**	**Rs.4380/- for 24.2 tonnes**	

The enterprise

One of the problems that emerged during farmers' discussions was with regard to maize threshing. Generally, after harvest, maize is dried and stored in famers' houses till market prices are good enough. Before selling though, maize must be threshed, i.e. grains separated from cobs. However, farmers face difficulty in getting labour for manual threshing which is also very time consuming. Machine threshing is another option, which is also easier than manual threshing. For this, small farmers depend on traders or bigger farmers who own a thresher. But often, farmers find it difficult to get a thresher on time, when the market prices are high.

For a small farmer, not getting a thresher in time would mean losing out on good price in the market. This could be understood by looking at the market price of maize in one season. In the previous season (November'17 to April'18), the market price of maize fluctuated between Rs.1060 – 1280 per quintal. The price depends on various factors like maize arrivals from Bihar, international market conditions, release of old stocks of maize etc. In such a dynamic situation, farmers keep a close watch on the local market, and try to sell when the market price meets their expectations (Rs.1250–1300 per quintal). But, whenever the market prices are high, there is a rush among farmers across the region to thresh their maize and transport it to the market. So, there is a lot of demand for threshers and farmers who do not own a thresher face a frustrating situation of having maize produce without being able to sell it even though the market prices are good. In one of the meetings, Karibasappa, member of group said regretfully," *If only I could have threshed my maize when the market price was Rs. 1200/ quintal, I could have sold my 96 quintals of maize at that time and earned extra Rs.10000"*. The group discussed the problem with Myrada Green College and jointly explored ways to support the farmers to thresh the maize in time so that they would be ready to sell when market prices were high.

MGC's ABPC provided the details of maize thresher to the Group. The group immediately showed interest in managing their own maize thresher. Myrada staff along with group representatives discussed about the cost of the thresher and ways to procure it. The cost of the thresher was Rs.188,000/-. The farmers found it unaffordable with their meagre savings. The Department of Agriculture had a scheme to provide the thresher at a subsidized cost of Rs.88,000/- to individual farmers. Even this amount was beyond the reach of farmers.

Therefore, ABPC extended support of Rs.88,000 to the group for the purchase of subsidized maize thresher. The group identified a member, Gu. Nagappa, who was eligible to obtain the subsidy. A tripartite agreement between the MGC, the group and the farmer (Gu.Nagappa) was signed to allow the ABPC to have the managing rights over the machine on behalf of the community. The thresher was procured in December 2017. It was handed over to Samruddhi group on 2nd of January 2018, to be operated for one season.

ABPC facilitated the group to work out the details of operation. The rate for threshing for non-members was fixed at Rs.50/quintal and the group members were offered a discounted rate of Rs.45/quintal. One member, Kalleshappa was selected as the operator. It was decided

that the running costs, maintenance, insurance will be met through the income from threshing. From the remaining, the group will retain Rs. 36,000 and the rest will go to Kalleshappa.

Marketing grain

The entire process of threshing lasted for 51 days and catered to the needs of 78 farmers. As per the agreement, the operator returned the thresher to ABPC after completing the threshing process, in May 2018. The enterprise resulted in profit of Rs. 36,280/- (after payment of Rs.36,000 to group), which was retained by the Operator as agreed. The details are given below.

Rajkumar from nearby Kodagavallihatti village says *"Kalleshappa provided excellent service to us and the quality of thresher is good. I threshed 120 quintals of maize when the price was good in market and paid Rs.6000/- to Kalleshappa after I got the payment from trader. Earlier, I was trying to get thresher from my village and asked for it several times when the price was going high but failed to get it. I got the information from Ashok Kodagavalli (a group member) about the maize thresher at Chikkayemmiganuru and the rent is lesser. Then myself, with some other farmers called Kalleshappa. Next day he started threshing at our village. In total, all the farmers who obtained the services from the thresher are happy because of timely threshing which in turn helped them to get good price."* The threshing enterprise has also helped Kalleshappa, the operator, to earn a reasonably good income for the season. 45% of the earning was given to 4-6 wage labourers, who were employed on daily basis depending on the workload.

Additional benefits

Besides this, ABPC also assisted the farmers to sell maize cobs directly. After separating grains from cob, empty cobs are heaped and used as fuel or for compost making. Sometimes farmers sell it to middlemen for throw-away prices or burn it in their fields. The middlemen quote a low lumpsum price to farmers for the cobs.

To get good prices for cobs, arrangements were made to collect cobs from the farmers' fields and transport it to the Gayathri Agro Fuels (GAF) in Challakere which is 80 to 90 Km away. GAF is a successful company working with the idea of *"Wealth from agri-waste"* - agri waste can be maize cobs / groundnut shells / coffee shells - GAF crushes the agri-waste into powder and compacts the powder to produce briquettes used in boilers, power plants. There is a good demand for briquettes which is a greener alternative to fossil fuels - oil/coal. In fact the demand is so high that GAF is willing to procure as much agri waste as it can be provided. ABPC is facilitating the farmers group to supply cobs directly to GAF for 2-3 times the price farmers used to get earlier. As simple as the linkage may sound, there are still lot of operational nitty-gritties to be learned. The main skill in the enterprise is loading the trucks with maximum cobs. Initially, the entrepreneur could load only about 5.5 – 6.5 MT, but with experience, about 9-10 MT is being loaded in a truck.

While selling cobs through middlemen, farmers used to get around Rs.250 to 300/- per tonne, while with direct purchase of empty cobs without middlemen, farmers can get 650 to 750/- tonne. Halamma, a farmer from Holalkere village, says *"I had grown maize in 3 acres of land. I used thresher and sold 48 quintals of maize @ Rs. 1280/ quintal. I also sold 0.6 tonnes of empty cobs and could earn extra amount of Rs.550."* Despite these benefits, it is a challenge to convince the farmers group to get involved the business of selling of cobs as it is usually seen as low value waste, so the group has identified entrepreneurs for this.

Seenappa, the village level entrepreneur who coordinated the business between Gayathri Agro Fuel Challakere and farmers says *"I learned how to buy cobs from farmers and load it in trucks. In future, I can earn Rs. 700/ truck/ day. It is necessary to motivate the farmers to sell empty cobs directly to GAF through farmers group"*.

Agri-waste (maize cobs/ groundnut shells) is transformed into briquettes, a greener alternative to fossil fuels and has a good demand.

Farmers transported maize cobs collectively to a company to recycle it as green fuel

Challenges and way forward

The group has realized that threshing can be a profitable enterprise. Encouraged by the results, the group is planning to procure one more maize thresher. Before that, there are several challenges and learnings from the experience, which need to be addressed. There is wastage of grains along with the cobs, which needs to be reduced by making certain improvements in the threshing process. As the thresher remains idle after maize threshing, there is a need to explore the possibility of using the same thresher for different crops like sunflower, finger millet, jowar etc. Also, presently ABPC is taking care of maintenance issues and this needs to be taken over by the community. Also, the insurance does not cover accidents/ damages during the transit of the thresher from one place to another, which needs to be looked into.

Having tasted success in working together for the threshing enterprise and selling empty cobs, this season, the group worked together to procure inputs in bulk, for the upcoming season. Thus, the farmers got the inputs at a discounted rate, in time, without having to take loans from money lenders.

Another related enterprise that farmers are experimenting with, is the chaff cutter- for cutting maize crop residue into small pieces, before feeding it to cattle. By doing so, wastage of maize crop residue can be reduced significantly. The group is also trying to sell maize in bulk to poultry and cattle feed companies. B.M.Vidya, MGC coordinator for the maize training says "*At the training, the participants learned not only farming practices but tried to look at agriculture as a business. While discussing their issues, they realised that their strength lies in working unitedly as a farmers' group, as it enables them to convert their problems into innovative business opportunities. A journey of a thousand miles begins with a single step - these farmers have made a small beginning with the self-belief that their future and the future of farming rests on their strong shoulders.*"

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