

## Simple solutions to complex problems

In 2015, the government of the Indian state of Andhra Pradesh launched the “Andhra Pradesh Community-managed Natural Farming” programme. The idea was to make farming climate-resilient and thus attractive again for young people. The recipe for this is mimicking processes in nature.

By Vijay Kumar Thallam and Swati Renduchintala

The year 2020 has offered us a glimpse of a future that is inevitable if business as usual continues. The COVID-19 pandemic and the subsequent lockdown in India have brought to forefront the cracks that were already persistent but mopped from sight. The collapse of the food systems across the world during this time shows the vulnerability of humankind not just to zoonotic viruses but also to the impending climate change crisis, which would further aggravate the current situation. The worst sufferers of these crises would be low- and middle-income countries, as their economies rely majorly on climate-based livelihoods and natural resources. In the context of countries like India, climate injustice looms greatest for children,

the small landholding farmers, rural women and tribal (indigenous) communities, pushing them to further marginalisation.

### The web of complex problems – farmers’ livelihoods, human health and environment crisis

It is an accepted truth that farmers’ distress is very acute and is increasing each year. The conventional agriculture practices have induced the farmer to rely heavily on synthetic fertilisers and pesticides, leading to higher dosages and higher annual costs. Extreme weather events like prolonged

dry spells, unseasonal rains and floods have increased the risks of crop failures. The market uncertainties are adding to farmers’ problems. All these factors are pushing farmers into a continual state of distress and a perpetual cycle of debt. This is also leading to distress migration of young farmers and farmworkers to urban areas.

At the same time, there are serious problems regarding the supply of food and its safety and quality. By 2050, the global population is expected to reach 9.7 billion. Food supplies are likely to be under far greater stress, and large populations are expected to face food scarcity. The existing practices of conventional agriculture are leaving chemical residues in the food. These practices have also led to severe



A farmer preparing jeevamrutham, a liquid inoculant made of cow dung, cow urine, jaggery, basin powder and topsoil.

Photos: RySS



Ground covered with mulch.

Abundant earthworm population = healthy soil.

A birdnest in a natural farming field.

reductions of nutrient density in the food. The COVID-19 pandemic has revealed the fragility of the immune system in a large number of people. The lack of nutrients in the food is one of the major factors in reduced immunity levels.

The current crop production and land management practices are resulting in continuous losses of soil organic matter. This in turn has led to a soil, water and biodiversity emergency. It has been estimated that world-wide, 40 to 60 per cent of soil organic matter is already lost, and with the current rate of degradation, topsoil will be completely depleted within the next 60 years. The use of synthetic chemicals in agriculture reduces the soil biology, which is so vital to creating soil organic matter. The chemical agriculture practices also contaminate groundwater and other water-dependent ecosystems, leading to biodiversity losses in the farmland. Prevailing agricultural practices such as mono-cropping are contributing to loss of crop biodiversity, and the use of chemical pes-

Andhra Pradesh is a south eastern state in India. Agriculture is its most important economic sector, employing nearly 62 per cent of the population, and contributing 28 per cent of Gross State Domestic Product (GSDP). Andhra Pradesh is also known as the Rice Bowl of India and has a diversified cropping system covering 8 million hectares of land in cropped area, while about 1.4 million hectares is under horticulture. Andhra Pradesh is India's largest producer of fruits, eggs and aquaculture products.

ticides is causing huge losses in biodiversity of insects. Global warming is exacerbating all the above effects.

The biggest tragedy is that the current crop production and land management systems are themselves a very significant cause of global warming. So while the food system is seriously impacted by climate change, ironically, the present food system is one of the biggest factors causing climate change.

### Transformative solutions

It is in response to these multiple crises that the Government of Andhra Pradesh has set up the Andhra Pradesh Community-managed Natural Farming (APCNF) programme. The underlying notion here is to turn to farming approaches that are in harmony with nature, as they build on ecological science, rather than on 'input economics'. By starting with, building on and improving the ecological conditions obtaining in each and every site, the concept of natural farming is showing that it is possible to reduce the need for external inputs, remove completely the need for synthetic inputs and deliver instead a form of farming that costs less, in financial and environment terms, and is more climate-resilient. It is called natural farming because it mimics the processes in nature to build healthy natural capital. This farming has been shown to have positive impacts on all the interrelated issues: farmers' livelihoods, young farmers' careers in agriculture, citizens' food, nutrition and health security, and restoration of the environment and mitigating climate change.

It safeguards our collective future by:

- reducing costs of cultivation and risks, and increasing yields. It is climate change-resilient, thereby creating fewer risks in farming. It is thus generating higher net incomes and regular incomes;
- producing more food – food which is safe, nutritious and free of chemicals;
- reducing the distress migration of youth from villages and creating reverse migration to villages;
- enhancing soil health, water conservation, regenerating coastal ecosystems and biodiversity.

The APCNF programme follows all the generic principles of regenerative agriculture (see Box on next page). Based on these principles, a wide range of practices have been developed by APCNF. Within these practices, there are a lot of variations depending on the area and the farming traditions of the communities. The not-for-profit company Ry.S.S. (Rythu Sadhikara Samstha, the Government Corporation for Farmers' Empowerment) provides a package of practices, through the farmer-led extension system. The farmers utilise them in combination with their own practices and innovations, and apply them to their fields and to crops.

### A major innovation: pre-monsoon dry sowing

One of the biggest breakthroughs in the APCNF programme is drought proofing

through the pre-monsoon dry sowing (PMDS) process. This breakthrough came as a result of experiments carried out in 2018. In the 2020 season piloting phase of the PMDS practice, farmers sow between 12 and 15 different kinds of seeds in dry soils from April onwards, without waiting for the rains. Thanks to the special Natural Farming protocols developed for PMDS, farmers are able to raise crops successfully in the pre-monsoon context. This has also been acknowledged as an important breakthrough by international experts. In the current year, more than 90,000 farmers have taken it up in 70,000 acres across all the 3,011 programme villages of the state. The sowing which started in April, on dry soils, goes on until the first major rains are received and farmers take up planting of crops in June, July or August. The objective is to ensure that all farmers in the State, especially those having only rainfed lands, are able to take crops throughout the year and are not subject to the vagaries of the monsoons. Farmers in semi-arid, drought-prone districts successfully take up two or three crops in a year, where previously they could take only one crop, and only if the weather conditions were favourable.

The PMDS initiative was initiated in the drought prone semi-arid areas, but now it has been taken up in all the farming situations in the State. Farmers have experienced higher paddy yields, lower pest attacks and lower costs. Research is being conducted to understand various dimensions of this critical breakthrough.

### Success factors of the scaling-up process

Our experience shows that natural farming is not only highly beneficial but is also scalable in a reasonable period, provided there is a proper strategy in place to scale it up. In four years' time, the number of farmers enrolled to practice natural farming rose from 40,000 farmers in 2016 to around 700,000 farmers and farmworkers in 2019 – a seventeen-fold increase in just four years. This is a very significant achievement. The APCNF programme has been recognised as the world's largest agroecology programme in terms of number of farmers enrolled. The target for 2020 and 2021 is 1,050,000 farmers and farmworkers – 700,000 farmers and 350,000 farm-workers respectively.

The real success of the Andhra Pradesh (AP) programme lies in the scaling-up strategy adopted, which includes the following factors:

### The generic principles of regenerative agriculture

- A healthy soil microbiome is critical for optimal soil health and plant health, and hence for animal and human health.
- Photosynthesis drives soil biology. Therefore, soil should always be covered with crops (the living root principle), throughout the year, to maximise photosynthesis and thereby maximise carbon getting into the soil as the root exudates.
- The soil across a farm or larger field/collection of fields should always have diverse crops; a minimum of eight crops over the year is recommended. The greater the diversity, the better.
- Soil should not be bare, as that will starve the microbes it contains. In the months when cropping is not possible, there should at least be crop residue mulch cover.
- Minimal disturbance of soils is critical, hence no-till farming or shallow tillage is recommended.
- Animals should be incorporated into farming. Integrated farming systems are critical for promoting natural farming.
- A healthy soil microbiome is the key to retaining and enhancing soil organic matter. Bio-stimulants are necessary to catalyse this process. There are different ways of making bio-stimulants. In India, the most popular ones are based on fermentation of animal dung and urine, and uncontaminated soil.
- Increasing the amount and diversity of organic residues returned to the soil is very important. These include crop residues, cow-dung, compost, etc.
- Pest management should be done through better agronomic practices (as enshrined in Integrated Pest Management – IPM) and through botanical pesticides (only when necessary).
- Use of synthetic fertilisers and other biocides is harmful to this process of regeneration, and is not allowed.

■ **Farmer-to-farmer extension system.** Best practising, champion farmers are the trainers. There is one farmer trainer per 100 farmers. This is the most critical innovation. Natural farming is knowledge-intensive and not input-intensive. Hence extension and intensive handholding plays a critical role.

■ **Setting up women self-help groups (SHGs).** Women SHGs are a crucial factor in collective action, knowledge dissemination, supporting each other during transition, financing members to purchase the inputs required for natural farming, and monitoring and managing the programme.

■ **Long-term handholding support to each farmer.** A farmer typically requires three to five years to make the transition. The AP project provides support to the farmer for this long duration, through the farmer-to-farmer extension system and the network of SHGs. Since the trainers are themselves practising farmers, their credibility is very high, and they are able to motivate other farmers to change.

■ **Whole village approach.** In AP, the objective is to convert all the farmers in a village into natural farming practitioners. APCNF has targeted all small and marginal farmers and tenant farmers in the village, who constitute more

than 85 per cent of farmers. It takes five to six years to change all the farmers in a village. Through the extensive network of SHGs, built over two decades, APCNF is able to reach out to all small and marginal farmers and tenant farmers in the village. Seeing these farmers reaping the benefits of natural farming, the remaining farmers are also opting for it.

■ **The support of the Agriculture Department** in the transition process has been very positive, and this is a really important factor for the success of the programme.

■ **Government investments** in Andhra Pradesh are for capacity building, knowledge dissemination and long-term handholding. It is estimated that it costs around 340 US dollars per farmer, and over six years of time to transform 80 per cent of the farmers in a village to natural farming.

■ **Building strong evidence in favour of natural farming is critical.** Several studies have been initiated by reputed national and international institutions.

### Scientific evidence

The APCNF programme accords highest priority to scientific evidence. The programme

Adaribariki Seethamma is a lead natural farmer living in the Pedalabudu village of Araku Mandal in Visakhapatnam district. Of her total land of one acre in the hilly areas, 0.5 acres is dry land, but available for farming. In May 2019, Adaribariki Seethamma started practising pre-monsoon dry sowing. She applied 200 kg of ghanajeevamrutham (compost made from cow dung, cow urine, jaggery, pulse flour, uncontaminated soil, etc.) and ploughed the soil minimally. On the 15<sup>th</sup> May, she sowed seeds of white rajma, red rajma, maize, tomato, red gram, ragi and other millets, leafy-vegetables and groundnuts. By the 18<sup>th</sup> May, all the seeds were sown in line after being treated with beejamrutham, a microbial seed-coating – except for groundnut, which was sown separately on the land. Seethamma used dry grass as mulch material and sprinkled soil on top of it to ensure that winds would not sweep it away. In the whole summer, rain only fell on June 6<sup>th</sup> (3 mm), June 28<sup>th</sup> (4 mm) and July 18<sup>th</sup> (7 mm). To cover the water needs of the plants, she started spraying dravajeevamrutham (liquid organic fertiliser) for two weeks, until the completion of the crop cycle.



Farmer Adaribariki Seethamma's motto is not to have her land empty.

Photo: RySS

To protect the crop from mosquitoes and other pest attacks and prevent flowers falling off, Seethamma sprayed Neemastram, a pest-control agent prepared with neem leaves, cow urine, cow dung and water. Tomatoes were the first to get harvested, a few of which she kept for self-consumption, others she sold on the local market and some she distributed in her neighbourhood. Seethamma harvested leafy vegetables almost daily, and there has not been a single day when her income was less than 500 rupees (Rs.). From this income, she is able to purchase groceries and other items for her children and for the house. People are fond of rajma (red kidney bean) seeds, which are grown in the Visakhapatnam tribal area. So, Seethamma started selling rajma on the local market. The gradual increase in the yield from rajma helped to increase her farm income.

She sold groundnuts on the farm itself. People who come to purchase them value them because they are especially sweet. After groundnuts in the Kharif season, she grew ragi, or finger millet. Her motto is not to have her land empty but keep sowing one crop after another. If anyone asks her why she is always doing this, she replies: "If we keep land fallow, weeds will grow, and it will become useless, whereas keeping land covered continuously also provides continuous income." And this has made Seethamma realise that farming can be profitable. She has even started receiving money in advance from others for vegetables.

In 2019, farmer Adaribariki Seethamma earned a total income of Rs. 28,000 from 0.30 acres of land along with food items for consumption, with a bare cost of Rs. 2,300.

has commissioned various studies for the same. These studies are for establishing the science behind natural farming, the socio-economic impact of APCNF, etc. Many more need-based studies are on the anvil. A large number of on-farm experiments are being conducted by young agriculture graduates and champion farmers. These are to help us to improve crop protocols.

Farmers' own experiments are important for the success of the programme. In the first year, they take up only a small portion of land under natural farming, while the rest of the land is under conventional, synthetic chemicals-based agriculture. After seeing the results of the first crop, farmers invariably analyse the differences in the two plots of land in terms of costs, yields, resilience, health impacts, etc. They also discuss aspects with other farmers,

and then they take a decision to expand the area. These pioneering farmers are responsible for motivating new farmers to enrol in natural farming, too.

To sum up, the APCNF programme is not only about the natural farming technology, but it is about a proper implementation plan to take the technology to every farmer in the programme villages, and to provide the necessary long-term handholding to the farmers to make the transition. As to date, the programme has a footprint in 25 per cent of the villages of the State, and around 10 per cent of farmers are enrolled in the programme.

The vision of the programme is to take this to all the estimated six million farmers and landless farmworkers in the State, and to bring the entire cultivable area in Andhra Pradesh

under natural farming. A very ambitious goal, but given the response of the farmers it is an achievable one.

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