



Taking Agroecology to Scale

Learning from the experiences of
Natural Farming in India

AF SA

ALLIANCE FOR FOOD SOVEREIGNTY IN AFRICA



Farmer Empowerment Corporation



A word from Trocaire, whose support has made this publication possible

Since 2016 Trócaire has underpinned its food systems work with the principles of Agroecology. Thousands of farmers, especially women farmers, have, with support from our African NGO partners, adapted and adopted agroecological practices which have raised their self-sufficiency in maintaining soil fertility. This has improved their households' resilience, particularly in dietary diversity, seed sovereignty, community solidarity and local economies.

The COVID crisis and the current food and fertiliser price crises can stimulate national, provincial and district authorities in Africa to follow Andhra Pradesh's successful approach and reach millions of smallholders with truly transformative agroecological technologies. This booklet can provide information, insights and inspiration about Andhra Pradesh's experiences for African actors in agriculture as they analyse the approach and practices and test their appropriateness for various contexts on the African continent.

It is hoped that increased investment in participatory agroecological research and co-creation of knowledge will result from sharing and discussing the contents of this booklet on farms, in communities and in the meeting rooms of those at all levels of food systems governance and their donors.

Rose Hogan, Sustainable Agriculture and Natural Resources Adviser, Trócaire

Trócaire

<https://www.trocaire.org/>

An artistic illustration of several hands of different skin tones (dark brown, medium brown, light brown) holding a green plant stem. The background is a soft pink and purple wash with various green leaves and white daisy-like flowers scattered throughout. The overall style is watercolor and folk-art inspired.

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సాధికార సంస్థ
Rythu Sadhikara
Samstha
Farmer Empowerment Corporation

AF SA

ALLIANCE FOR FOOD SOVEREIGNTY IN AFRICA

Andhra Pradesh Community Managed Natural Farming Programme (APCNF)
and
The Alliance for Food Sovereignty in Africa (AFSA)

Organisations and initiatives mentioned in this booklet

Alliance for Food Sovereignty in Africa (AFSA) – <https://afsafrika.org/>
Andhra Pradesh Community-manage Natural Farming (APCNF) – <https://apcnf.in/>
Agroecology Fund – www.Agroecologyfund.org
La Via Campesina – www.viacampesina.org
Rythu Sadhikara Samstha (RySS) – <https://apcnf.in/ryss/>
Trocaire – <https://www.trocaire.org/>

The participating AFSA members

Bio Gardening Innovations (BIOGI), Kenya – <https://biogardeninginnovations.weebly.com/>
Bridge2Rwanda – <https://www.bridge2rwanda.org/>
Chinyika Trust, Zimbabwe – chinyika@chinyikadevelopment.net
Groundswell, West Africa – <https://www.groundswellinternational.org/>
Kasisi Agricultural Training College (KATC), Zambia – <https://katczm.org/>
Organic Agriculture Centre of Kenya (OACK), Kenya – <http://oack.or.ke/welcome-to-oack/>
Rucid Organic Agriculture Training College, Uganda – <https://www.rucid.org>
SCOPE, Malawi – <https://scopemalawi.com/>
Shashe Agroecology school, Zimbabwe – <https://www.facebook.com/zimsoff/>
St. Jude's Agroecology college, Uganda – <https://www.stjudefamilyprojects.org/> and <https://stjudeagrivic.edu.ug>
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Dharmendar Gogu and his team took large groups of people via 6 x 3-hour calls on zoom through the nine principles of Natural Farming as followed by the programme in Andhra Pradesh.

Representatives of the twelve AFSA member organisations (see above) made presentations on how their work with farmers is going in terms of putting the nine principles of Natural Farming into practice.

Chandrasekhar Chakrala for the presentation on the Community-managed Natural Farming program in Andhra Pradesh's (APCNF) approach to working with social capital and the role that this has played in advancing Natural Farming in Andhra Pradesh.

Nagireddy Chinta who presented APCNF's monitoring and evaluation system

G. Muralidhar who presented the role of champion farmers and other resource people in the programme and who brought his experience and wisdom into a number of the zoom calls

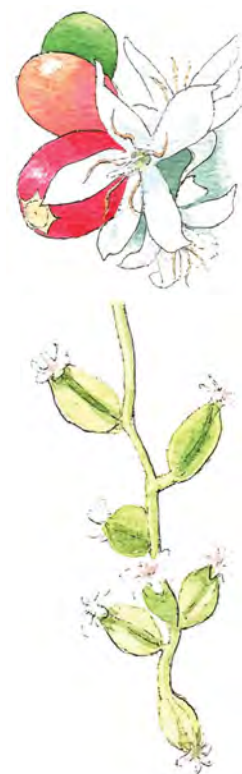
Vijay Kumar and Million Belay who have been giving their enthusiastic support and backing to the joint learning programme between AFSA and CNFAP.

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Charles L. Tumuhe for moderating many of the sessions and organising part of the text for this booklet.

John Wilson pulled it all together and takes responsibility for any errors there may be.

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Bridging two continents through Agroecology

From T Vijay Kumar, Executive Vice-chairman, Rythu Sadhikara Samstha (RySS), Andhra Pradesh, INDIA:

I am honoured to write this message for this crucial booklet capturing the key learnings of the AFSA – RySS/ APCNF collaboration. The world around us has changed drastically over the past two years and it has brought to the forefront the need for climate-resilient, pandemic resilient, sustainable food systems. Agroecology and Natural Farming are the way ahead. Our work through the Andhra Pradesh Community-managed Natural Farming programme (APCNF) has addressed some major gaps in scaling up Agroecology – nature-friendly and people-friendly technology of Natural Farming, farmer-to-farmer dissemination, the social capital of women self-help groups and their federations, and the support of the government. The Natural Farming champions are leading transformations at the village level. This has been a game-changer ever since.

While we are separated by continents and different contexts of Agriculture, there are so many similarities in terms of the problems and the solutions. I see an incredible commitment in AFSA to change the current destructive and inequitable system of agriculture to a regenerative and sustainable food system, in harmony with nature. And to create a new food system which is equitable and respects farmers and women. The past year and a half of knowledge exchanges between AFSA partners and APCNF have better enriched our understanding of Agroecology. I am hoping this booklet will be the beginning of several such documents that are useful and relevant to the African communities and Civil Societies working with them. I also affirm Rythu Sadhikara Samstha (RySS) commitment that APCNF will continue being a co-traveller in this journey of Healthy Soil Healthy Food.

From Million Belay, the General Coordinator of The Alliance for Food Sovereignty (AFSA):

Growing up in Addis Ababa, soil meant getting scolded by my mother for muddying my clothes. Later, I began to learn more about soils, that good soil equalled good crops and the thing I had despised the most as a child had become, for me, the very source of life. The more I learned about Agroecology, the more I grew to appreciate soil. I was lucky to become a member of the “Healthy Soil and Healthy Food” project team under AFSA, taking place in 15 African countries. My luck continued when we started working with the Andhra Pradesh initiative in India to learn more about how to improve our soil in Africa.

Andhra Pradesh was a pioneering green revolution state in India. Not only did this harm the farming environment but has resulted in unsustainable debt for many farmers. But now, the Andhra Pradesh's Community-Managed Natural Farming initiative has become a shining example of how hundreds of thousands of farmers can break away from the grip of the green revolution and restore life to the land. We are thrilled to have this opportunity to learn from them, while I am confident that our Indian colleagues can learn from our diverse and culturally rich continent. Our conversation has only just begun!

The Significance of Andhra Pradesh Community-managed Natural Farming

Hundreds of thousands of farmers in Andhra Pradesh, soon to be millions, are successfully shifting away from chemical-based monocropping towards Natural Farming. In doing so, they are discovering they can be financially viable while working with healthy, living soil.

Pioneering Champion Farmers are leading the way, while women-led Self-Help Groups provide essential moral and institutional support to farmers as they move to Natural Farming.

The Champion Farmers are well-supported by Andhra Pradesh Community-managed Natural Farming (APCNF) extension workers to transition to Natural Farming quickly and effectively, becoming an inspiring example to their fellow farmers and an invaluable resource to their communities.

This Natural Farming programme in Andhra Pradesh offers exciting possibilities for African farmers. They know from bitter experience that they have made a big mistake in adopting chemical-based, monocropping farming practices. There are many pockets of alternative approaches, similar to Natural Farming, but no examples yet of these alternatives being taken to large numbers of smallholder farmers.

However, in Andhra Pradesh, they have discovered how to take Natural Farming to scale by providing a learning example for smallholder farmers globally to reach this new, modern way of Natural Farming based on old wisdoms.

The movement toward Natural Farming is key to food sovereignty, a crucial element of farmers' political and economic struggle to secure sustainable livelihoods for their families. In an expression of South-South solidarity, the Alliance for Food Sovereignty in Africa (AFSA) has entered into a joint learning programme with the Andhra Pradesh Community-managed Natural Farming programme.



The Aim of this Publication

This booklet aims to provide you, as people leading and supporting the move to Agroecology in Africa, with lessons from the valuable experiences of the APCNF programme. We have included helpful inputs, discussions and conclusions from the 15 online sessions held over 2021/2022. You will also find good reminders, new insights, questions and ideas to assist you in your learning journey to Agroecology.

The Origins of Andhra Pradesh Community-managed Natural Farming in India

Over the past few decades, farm distress in Andhra Pradesh has increased significantly, including distress migration and in worse cases, suicide. This is often due to farmers' falling into debt traps. The debt is primarily caused by purchasing inputs like fertilisers and pesticides. Not only is there the increasing cost of these inputs, but their contribution to degrading the farm environment, particularly the soil, means that farmers become dependent on them while crop returns fail to cover the increasing input costs.



As part of an India-wide programme to address livelihood issues, a great deal of social mobilisation happened in Andhra Pradesh from the early 2000s. This has been chiefly centred around Women's Self-Help Groups (SHGs), linked to savings and loans. Over the years, these institutions have emerged.

During the last few decades, many alternatives to chemically-oriented agriculture, often known as the green revolution, have emerged in India. Many are based on or borrow from traditional practices. One approach, called Zero Budget Natural Farming (ZBNF), is explicitly focused on reducing farmer input costs. La Via Campesina members in southern India adopted this approach and began holding large training programmes. At times, up to 5,000 farmers participated, and from there, uptake of ZBNF started to spread.

T.Vijay Kumar, an accomplished bureaucrat in the Indian Administrative Services (IAS), returned to his State cadre to head the Agriculture department to initiate the APCNF programme (Erstwhile APZBNF). After his superannuation in 2016, he has been at the helm of steering the Natural Farming programme full-time.

An Indian philanthropic foundation supported the initial work, and the Andhra Pradesh government has utilised the centrally sponsored schemes to finance the programme. Eventually, external aided projects with international banks also joined to support more villages transitioning to Natural Farming. Most funding supports learning and provides backup assistance for farmers in the process.

A state-owned institution called Rythu Sadhikara Samstha (RySS), implements the programme. The approach's name has changed from ZBNF to Andhra Pradesh Community-managed Natural Farming (APCNF).

This programme has become the largest in the world to take Natural Farming to a significant scale and thus provides inspiration and a learning opportunity for others who want to follow their example.



AFSA's partnership with RySS and the origin of this booklet

There are thousands of farmers practising Agroecology on their farms around Africa. Some of these are farmers who are strengthening their traditional practices. Many have decided to drop the chemical way of farming for various reasons, often for health reasons, but most often because of affordability.

Since 2010 many networks of smallholder farmers, local NGOs, pastoralists, fisherfolk, and indigenous peoples have come together to join AFSA. AFSA is increasingly linking the work at the continental level, such as through its Healthy Soil Healthy Food (HSHF) initiative. AFSA is also becoming a robust continental voice for Agroecology and food sovereignty.

At an Agroecology Fund gathering in Karnataka in early 2020, participants visited farmers using Natural Farming. Several AFSA members were present at the gathering.

During the last quarter of 2020, AFSA's Healthy Soil Healthy Food (HSHF) initiative organised a series of webinars. These included two sessions with APCNF's Vijay Kumar and his team. They introduced Natural Farming and its upscaling in Andhra Pradesh to more AFSA members. In April 2021, Vijay Kumar presented to AFSA members the social capital dimension of the APCNF programme and the critical part this has played.

In August 2021, CNF/RySS and AFSA agreed to hold a learning programme via video conferencing. The programme began with 6 x 3-hour sessions in October – November 2021, during which RySS staff shared the basics of Community-managed Natural Farming as practised in Andhra Pradesh. These presentations focused on the 9 Natural Farming principles that RySS uses to guide its programme.

In early 2022 12 African organisations that had participated in the RySS sessions each made a short presentation reflecting on the nine principles in their context. They shared the successes and challenges they are experiencing in working with those principles.

A series of five online meetings then took place to present a synopsis of the African organisations' presentations, to go into more detail on the biofertilisers some AFSA members are using, and to learn more about what is behind the success of the CNF programme in Andhra Pradesh.



Understanding the Nine Universal Principles of Community-managed Natural Farming










(as developed by the Community-managed Natural Farming programme in Andhra Pradesh)

A paradigm shift

“In a true sense, Community-managed Natural Farming (CNF) is a paradigm shift in agricultural development. The findings of earlier studies and the current survey indicate that CNF can resolve most of the pressing problems of the farmers and agriculture in the state. CNF can reduce the cost of cultivation and enhance the profitability of farming considerably. It enhances the quality of the soil and local environment, including the revival of environmental services. It results in positive health and cordial outcomes at the individual, family and community levels. It is pleasing to note that CNF is making agriculture climate change resilient, to some extent. Evidence from different parts of the state suggests that CNF crops can withstand prolonged dry periods, heavy rains, and strong winds compared to non-CNF crops.”

Community-managed Natural Farming is not a recipe but a farming paradigm based on nine principles. These principles are fundamental guidelines that overlap and act together to produce the conditions required for the natural and healthy development of plants and animals.

The Nine Universal Principles of Natural Farming:

-  **1 Crop cover**
Soil to be covered with crops 365 days of the year (living roots)
-  **2 Crop diversity, including trees**
Includes at least 8 – 12 species in any one cropping area
-  **3 No/low till**
Keep tillage disturbance to a minimum, ideally not at all
-  **4 Integrate animals**
Have livestock as an integral part of the farming system
-  **5 Use of bio-stimulants**
Select and use appropriate bio-stimulants as necessary catalysts to speed up life returning to soils
-  **6 Organic matter addition**
Increase organic matter by adding dry mulches
-  **7 Local seeds**
Use only local or traditional seeds
-  **8 Pest management (prevention/monitoring/curative/no pesticides)**
Understand pest life cycles and use non-poisonous methods to address the weakest link in the pest life cycle
-  **9 No chemical stress**
Avoid all chemical pesticides, herbicides and fertilisers



Crop cover

Soil to be covered with crops 365 days of the year (living roots)

Nature aims at maximum ground cover with green plants. We are only now realising the full extent of why this is important. We've known for some time now that cover ensures better water infiltration when it rains. With cover, raindrops do less damage to the soil, and water infiltrates more easily along plant roots.

A greater understanding of the relationship between microbes and plants has emerged in recent years. Plants exude (push out) substances that microbes consume. The microbes, in turn, provide the plants with nutrients. This cycle makes the soil richer and healthier. There is the old saying 'healthy soil makes healthy plants', but we now know you can turn this around and say 'healthy plants create healthy soil'.

The longer plants grow and cover the soil throughout the year, the more the soil will benefit.

In Andhra Pradesh, farmers plan toward a 365-day green cover by breaking the year into three parts. Then they plan their planting for each of these periods. What they plan depends on local factors such as the average rainfall of the area, type of soil, etc.

Linked to this principle, the programme has introduced a practice known as **Pre-Monsoon Dry Sowing (PMDS)**. In this practice, farmers sow pelleted seeds during the dry season. This seed germinates with the first rains. This can be as little as 10 – 15mm of rain. These young plants can survive 25 – 30 days without any further rainfall. There are three ways in which Natural Farming practices help young seedlings access water in dry conditions:



What are Pelleted Seeds?

Each seed is coated with a layer of clay to increase its size for easier handling. This makes spacing the seeds much easier and enables growers to use set spacing on their seeding machines. It also increases evenness in germination.

- i) The seed inoculant, applied with the pelleting, ensures that there are active microbes at germination. These microbes, especially fungi, fetch moisture for new roots. Without these microbes, the plants would not access this moisture.
- ii) Furthermore, the microbes help break down the mulch. From this dry mulch comes latent water, which is available to the plants.
- iii) As the shoot grows, it offers a cool surface area for the air's water vapour to condense. The plant is thus able to use water vapour from the air.





Principles to Follow in Natural Farming

Natural Farming has no strict rules, only principles to guide you as you learn to become a better natural farmer. Natural Farming is not only about replacing chemical inputs with organic inputs but also about creating a farming system that is in tune with the way Nature operates.

1 Crop cover

Aim towards green cover for as long a time as possible

Nature aims at maximum ground cover with green plants, including trees, which means there's little if any damage to the soil from raindrops, and water infiltrates more easily along plant roots. Not only does 'healthy soil make healthy plants', but 'healthy plants create healthy soil'. So, the more plants covering the soil throughout the year, the healthier the soil.

2 Crop diversity

Include at least 8 – 12 species in any one cropping area

If you can get 8 to 12 different plants, including trees, growing near each other then this multiplies the interactions and benefits between the plants. Each plant pumps a unique set of substances into the soil, attracting different varieties of beneficial microbes.

3 No/low till farming

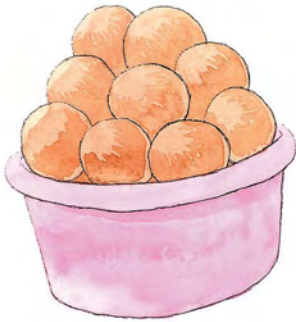
Keep tillage disturbance to a minimum, ideally not at all

Ploughing disturbs the structure of the soil, ripping through living fungal threads woven extensively through all healthy soil. These fungi in the soil make glue to hold the soil together in what are called 'stable soil aggregates'. Zero or minimum tillage contributes to soil with those all-important stable aggregates. This is soil that is rich, loose and crumbly.

4 Integrate animals

Have livestock as an integral part of the farming system

Natural Farming produces lots of biomass that can feed animals who produce manure. Fresh manure is super-charged with a large diversity of microbes, a good source for making bio-stimulants. In grasslands with long dry seasons, the microbes in ruminants' stomachs play a critical role in breaking down the dry grass.



5 Use of bio-stimulants

Select and use appropriate bio-stimulants to speed up life returning to soils

Bio-stimulants are tonics for the soil and plants to help quickly bring life back to the soil and plants by inoculating them and the soil with microbes. The microbes then ensure plants get nutrients in return for receiving sugars from the plant roots. Once the soil is healthy enough, bio-stimulants shouldn't be needed.



6 Organic matter addition

Increase OM through the addition of dry mulches

Nature always covers and protects the soil, so we must do the same. Thick mulch covering the soil around plants, using any available dry matter, is another critical practice in Natural Farming. Mulch helps create a comfortable and moist home for microbes. Mulch also keeps the soil cool in hot weather.



7 Local seeds

Use only local/traditional seeds

Natural Farming has an emphasis on using local and traditional or heirloom seeds. Farmers have evolved seeds for their own situation for thousands of years to suit particular soil and climates. Modern hybrid and GMO seed varieties are not adapted to local conditions and must often be used with toxic chemicals.



8 Pest management

Understand pest life cycles and use non-poisonous methods to address the weakest link in pest life cycles

Pest management is complex when shifting to Natural Farming. The key is understanding the life cycle of pests and focusing on the weakest link in this cycle. There are many different natural approaches to choose from.



9 No chemical stress

Avoid all chemical pesticides, herbicides and fertilisers

Natural Farming means stopping all chemicals. If you're currently farming with chemicals, start with a small section of your farm to learn how to do this. Then expand your Natural Farming area with confidence.

2

Crop diversity, including trees

Includes at least 8 – 12 species in any one cropping area

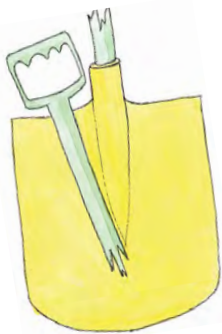
This principle links closely to principle No. 1 above. Remember that all the principles overlap and act together. Each plant pushes out a unique set of substances into the soil. This, in turn, attracts different microbes. More and greater diversity of microbes means healthier soil. At certain levels of diversity, even more healthy dynamics kick in. It is difficult to understand fully, but it simply means that the more diversity, the better. There's obviously a limit to this from a management perspective. In Andhra Pradesh, they recommend there should be a minimum of 8 - 12 species in a cropping area.



This diversity can be made available in different ways. For example, we know from experience the value of cotton intercropped with a mixture of species between the rows of cotton. The purpose of mixing different plants could be simply to help the health of the soil. Because plants push out (exude) more substances into the soil when they are still young, the recommendation is to cut the intercropped plants back before flowering. This will allow regrowth and thus more pushing out of sugars into the soil from the roots.

How one achieves this bio-diverse cropping has many possibilities. It is a new area of learning for nearly everyone. It needs careful planning and local experimentation. The choice of plants will depend on the context, the soil and the production aims. Use of trees and other woody perennials like pigeon pea will likely play a key part in many situations. As will cover crops like cowpeas.

This experience of diverse cropping makes it even more apparent why monocropping is so bad for soil health.



3

No/low till

Keep tillage disturbance to a minimum, ideally not at all

This is the principle that many farmers are finding to be the most difficult to follow in Andhra Pradesh. Ceasing to plough is difficult for many farmers. Ploughing has been an inherent part of farming for a long time. It also helps farmers to control weeds, mainly perennial weeds.

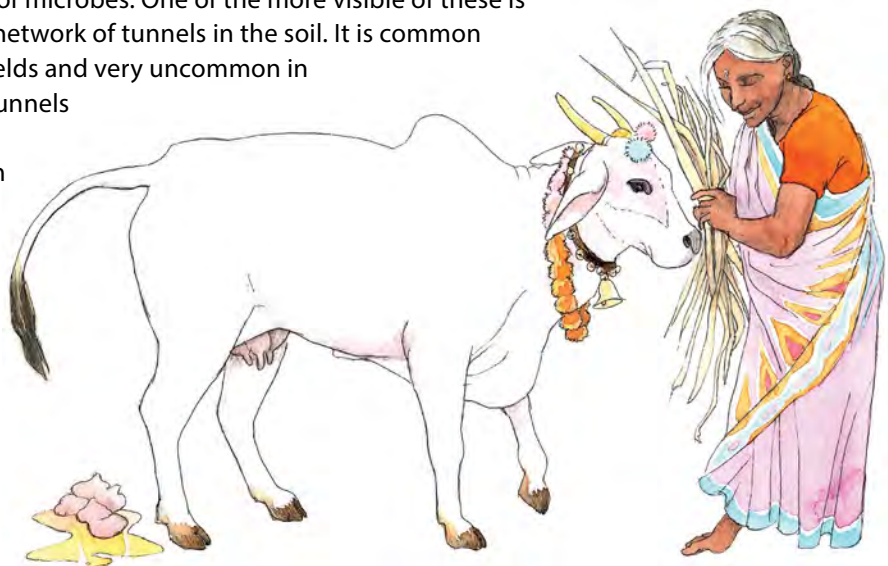
But there are several more significant problems related to tilling the soil.

Ploughing disturbs the structure of the soil. As a result, ploughed soil loses lots of carbon to the air through oxidation, contributing to the climate crisis. In addition, ploughing rips through fungal threads woven extensively throughout healthy soil. These fungi in the soil make glue to hold the soil together in what we call 'stable soil aggregates'.

Healthy soil has a huge diversity of microbes. One of the more visible of these is worms. Worms make an extensive network of tunnels in the soil. It is common to find worms in natural farmers' fields and very uncommon in those using chemicals. The worm tunnels help infiltrate more water in heavy storms. Ploughing breaks the worm tunnels and dramatically disturbs the worms.

Nature does not plough.

Zero or minimum tillage, combined with the other principles (so no herbicides either), can quickly lead to soils with those all-important stable soil aggregates. This is soil that is loose and crumbly.



4

Integrate animals

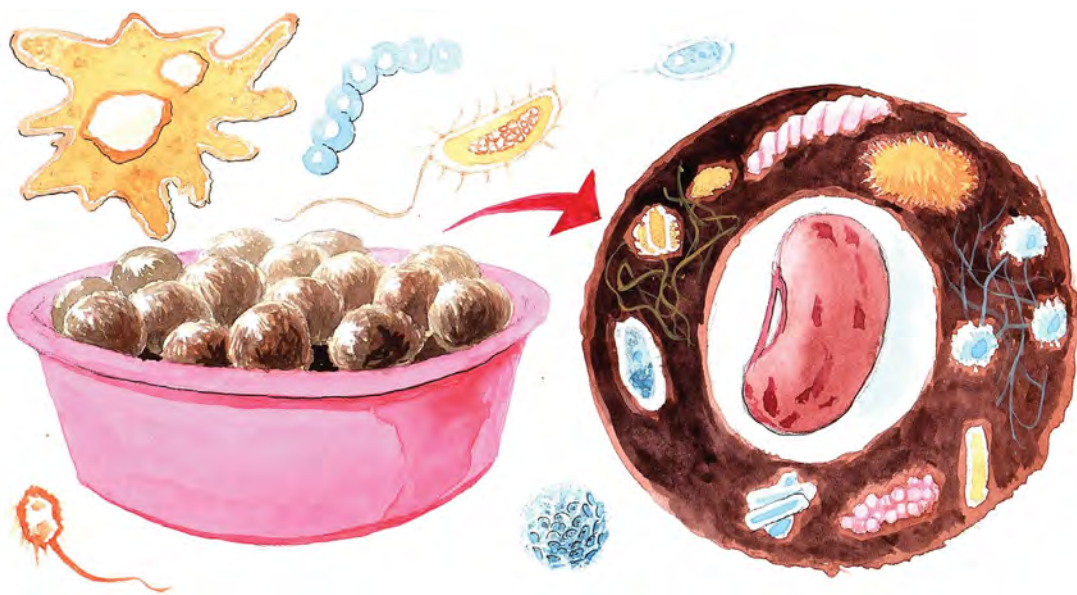
Have livestock as an integral part of the farming system

Nature never farms without animal life, whether bees, livestock/ruminants, poultry and even humans! We need to be more conscious of how to ensure that their contribution is optimised.

Natural Farming produces diverse biomass that can usefully provide animal fodder and be converted into manure. This process uses the microbes in the stomachs of livestock/ruminants and then provides microbes for farming.

The fresh manure is supercharged with a large diversity of microbes with ruminants. This becomes a good source for making bio-stimulants, which can then be used to re-activate life in the soil.

Where grasslands are involved in areas with long dry seasons, the microbes in ruminants' stomachs play an important part in breaking the dry grass down. If it is not microbe-diverse stomachs of ruminants breaking down the grass, people will often resort to fire. But fire usually does much more harm than good.



5

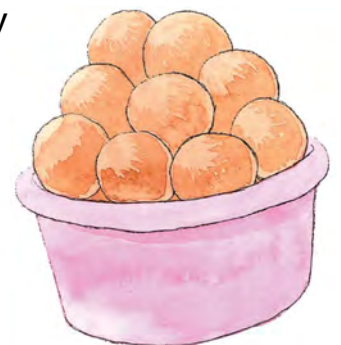
Use of bio-stimulants

Select and use appropriate bio-stimulants as necessary catalysts to speed up life returning to soils

A key focus in Natural Farming in Andhra Pradesh is the use of bio-stimulants. These simple homemade recipes help bring microbial life quickly back to the soil. Farmers combine bio-stimulants with mulch and diverse cover cropping rather than using compost or manure. This reduces labour requirements. The biostimulants inoculate the soil with microbes. The microbes then work to ensure plants get nutrients in return for receiving sugars from the plant roots. Once the soil is healthy enough, the soil microbiome becomes self-generating, and bio-stimulants should not be needed. It could take a few years for this to happen.

There are hundreds of recipes for bio-stimulants, biofertilisers and bio-inoculants. It can be overwhelming for someone new to Natural Farming to decide what recipe to use and how and when to do so. The AP program has helped farmers new to Natural Farming to do this by providing a recommended set of bio-stimulants.

Champion farmers, who have experience and know how bio-stimulants work, advise farmers on how to use them. This makes it straightforward for farmers to enter the complex world of Natural Farming. This is one of the big successes of the programme, finding and sharing this 'package' of bio-stimulants that work in the Andhra Pradesh environments.



There are four different processes or recipes that farmers new to Natural Farming use in Andhra Pradesh. These recipes, as well as links to films of farmers making them, can be found on the APCNF website:

- i) **A seed inoculant** that helps ensure plants get off to a good start, boosted by a variety of microbes.
- ii) **Seed inoculation combined with pelleting.** This is used for dry sowing – see the detail on PMDS under Principle 1. Pelleting is an excellent way to keep seed viable and helps ensure better germination and establishment.
- iii) **Solid bio-stimulant:** Any extra fresh cow or buffalo manure is mixed with other ingredients and rolled into 10cm diameter balls. These are dried for storage. They crumble into the soil at planting time.
- iv) **Liquid bio-stimulant:** this is a short aerobic fermentation with fresh cow manure and other ingredients for about five days. It is made during the primary cropping season and sprayed onto crops every 10 – 15 days.



6

Organic matter addition

Increase organic matter by adding dry mulches

Thick mulching with dry matter is another critical practice in Community-managed Natural Farming. Without this protection, it is difficult for soils to recover or remain healthy. Mulch helps create a comfortable home for microbes.

Mulch keeps the soil moist for much longer. It also keeps the soil cool in hot weather. Perhaps surprisingly, dry mulch contains moisture that soil, alive with microbes, can help plants access. As indicated above, this is a vital part of how PMDS (dry sowing before the rains) works. Nature always covers and protects the soil. Effective natural farmers do the same. If farmers plough and apply manure, as many farmers wanting to avoid chemicals do, they may get a reasonable yield, but the soil health will not improve.

It is not easy to find mulch in some places. But in Andhra Pradesh, farmers are even prepared to buy mulch at times. This shows how they value mulch. More proactively, farmers are now planning their crop combinations in such a way that they also produce mulch and fodder for themselves, avoiding the need to buy. They can do this, for example, by pruning trees in their agroforestry systems or growing high mulch-producing crops such as well-spaced finger millet.

7

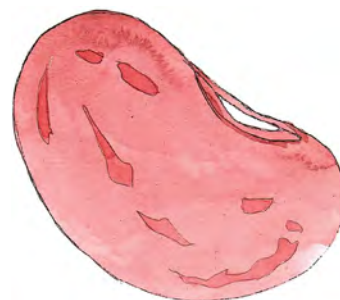
Local seeds

Use only local or traditional seeds

Natural Farming emphasises the use of local resources to strengthen farmer independence and resilience. This includes microbes, mulches, seeds and knowledge. Every farm is unique, and farmers know their farms best. Farmers have been evolving seeds for their situation for thousands of years. Local microbes have been in 'their' environment for millions of years.

Most professional seed breeders develop their 'improved' seed in combination with the use of chemical fertilisers and pesticides. These varieties struggle without the same chemical inputs from the farmers, which have to be bought, are unhealthy for the soil and add another input burden on the farmers.

On the other hand, local/traditional seeds are more adapted to the area where they have evolved. This makes them more resilient and resistant to pests and diseases. They are often selected for better taste and have beneficial nutritional and therapeutic value. In addition, when we want to have around 18 crops or more each season, it is much more convenient and reliable to access seeds locally. Farmer-managed seed systems are naturally diverse and contribute to the greater biodiversity we badly need for healthy farm environments.



8

Pest management

Understand pest life cycles and use non-poisonous methods to address the weakest link in the pest life cycle

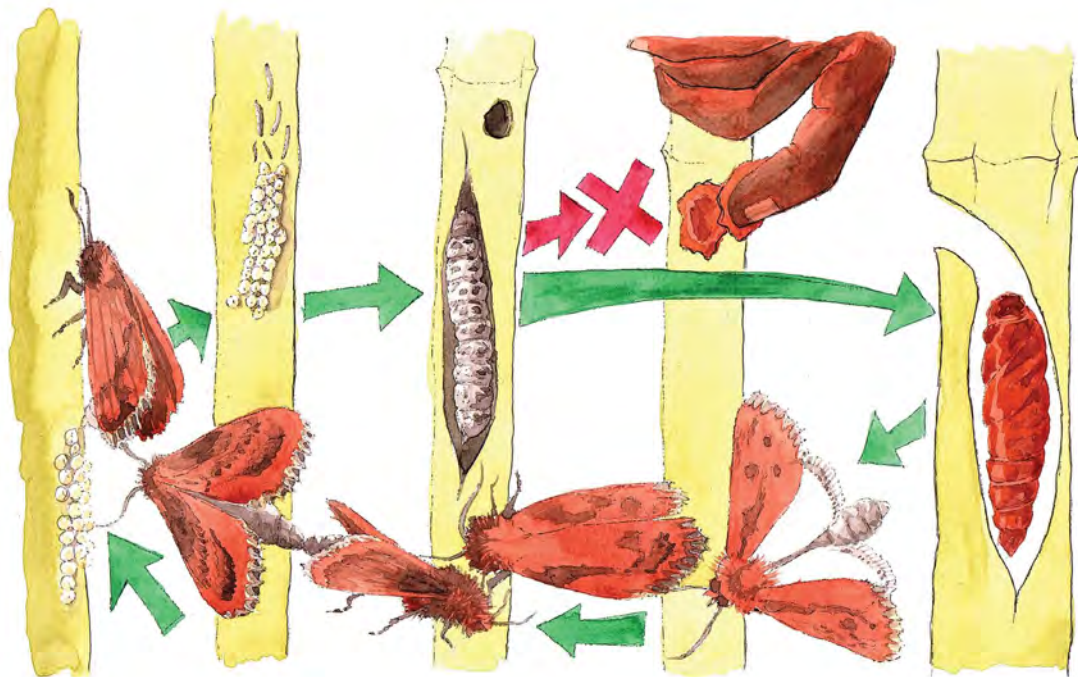


This includes prevention, monitoring and curing without the use of poisonous chemical pesticides.

A pest management programme ran for many years in Andhra Pradesh before the beginning of the Natural Farming programme in 2016. This was to help reduce the high use of pesticides in Andhra Pradesh. In this pest management programme, the emphasis has been on understanding the life cycles of pests and then dealing with pests at their weakest link. This is when they are most vulnerable. For example, the weakest link for stalk borer is at the immobile larval stage. Pouring a mixture of neem and clay or sawdust into the funnel of affected plants can effectively control the stalk borer larvae.

The Natural Farming programme provides information to farmers on a range of pest management methods. These methods include:

- Designing intercropping with plants that repel certain pests,
- Crop combinations to 'muddle' or disorient pests,
- Mechanical practices, such as
 - botanical sprays that act as a prophylactic against pests or diseases
 - botanical preparations that get rid of the pest
 - Traps



9

No chemical stress

Avoid all chemical pesticides, herbicides and fertilisers

Transitions to Natural Farming or Agroecology-related practices look at a gradual reduction of chemicals and artificial fertilisers. The approach in Andhra Pradesh is a 'cold turkey' one, which means stopping all chemicals immediately, one piece of land at a time. The recommendation is to start with a small section of a farm first. This helps a farmer learn about Natural Farming. Then (s)he can expand confidently into other crops and the rest of the farm.

Natural Farming means no artificial chemicals at all. This enables Nature's dynamics to kick in without being hindered by toxic substances.





Factors for success on a large scale

In this section, we explore some of the features that are helping to make Andhra Pradesh Community-managed Natural Farming (APCNF) successful in spreading the practice. Bear in mind that it would be impossible to simply replicate the programme in Africa. However, we believe that understanding the essential principles and leading ideas behind the success of APCNF gives us a good opportunity in Africa to adapt these for our use. We do not see why we should not succeed in our own way.

The Agroecology movement is spreading around Africa. A growing number of farmers are taking up the practice of Agroecology, which includes the ecological approach of Natural Farming. But Agroecology goes beyond this to include socio-political and economic principles, especially around seed and food sovereignty and the right to land and water. These principles challenge farmers, consumers and their governments to take serious measures to support and develop food systems that enable farmers to produce healthy food for citizens to eat.

Citizens are increasing their awareness of the ills of a 'western' diet, emphasising over-processed and imported foods. Recognition of the wisdom of traditional foods and diets is coming back. Understanding the link between healthy soil, healthy plants, healthy diets, and healthy people is growing. People are experiencing how the chemical approach of the "green revolution" to farming damages their soils and farms' ecosystems and creates dependencies on external inputs. Their pockets are telling them it is not financially viable.

The Covid lockdowns revealed more profound flaws in our broken food systems, dependent on wealthy corporations and governing systems, more interested in profits than people's health. And yet, despite this, millions of ordinary citizens worldwide showed surprising resilience by growing their own food, often without chemical inputs. This shows us that we can move towards food sovereignty on a mass scale if we learn and work together to take up the challenge.

The climate emergency has become a massive crisis exposing the weakness of these food systems and the need for unprecedented resilience at all levels of society, to face the uncertain future. Natural Farming and Agroecology will be critical to this.

The time is thus ripe for the spread of Agroecology to much larger numbers of farmers.

We do not yet have an upscaling programme as they do in Andhra Pradesh. Let us learn from that programme and adapt to our different situations. We can begin our own upscaling programmes in places with this potential.





How the programme evolved:

The programme started under the name of Andhra Pradesh Zero Budget Natural farming (APZBNF). This reflected its strong emphasis on financial viability. Even though the name changed in 2021 to Andhra Pradesh Community-managed Natural Farming (APCNF) this emphasis has remained. The new name brings in the importance of community in taking the agenda of Natural farming principles forward.

Social movers and shakers - The role of Women's Self-Help Groups (SHGs):

The Natural Farming programme has been well supported by the Women's Self-Help Groups (SHGs) programme across India to address poverty. The foundation for the self help movement in India started from the work of mobilising women through the Society for Elimination of Rural Poverty Programme in the erstwhile Andhra Pradesh. Andhra Pradesh state has been active in supporting SHGs since then. At the heart of these SHGs are savings and loans along with cultivating a vital social capacity for transparency and accountability.

What does Social Capital mean in APCNF?

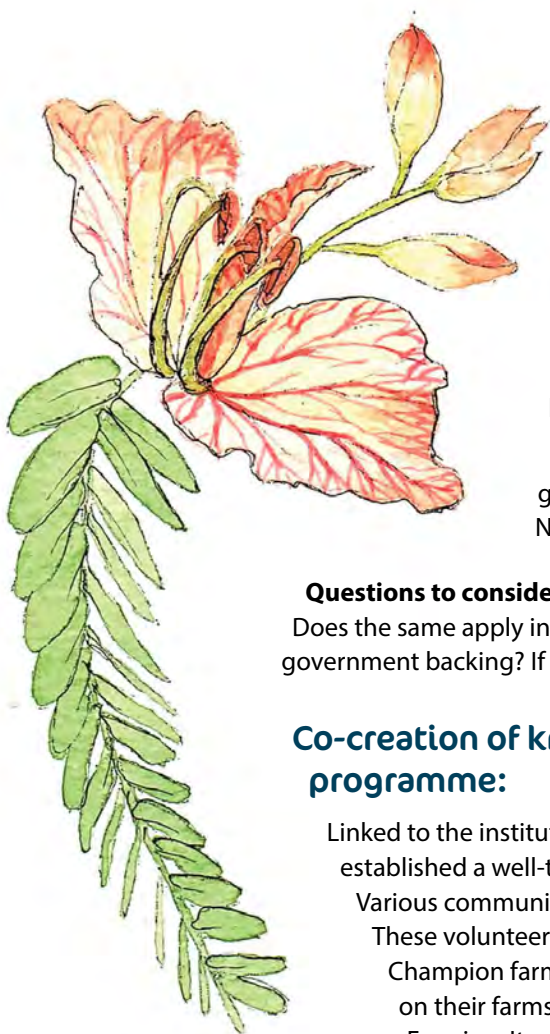
Social capital may be seen as interpersonal trust in the relationships among a society's members, institutions and organisations that emerge from the community and work for the community. Social capital is advanced human resources that facilitate communities and work together with them effectively to achieve a common purpose or goal. It also includes capabilities in the knowledge and skills that people develop, often together, to manage their livelihoods, resources and institutional support. A focus on building social capital ensures that knowledge stays with the community.

The Natural Farming programme in Andhra Pradesh took off in 2016. Initially the programme worked with men farmers for the first two years. It was realised that the rate of transformation was slow and, at the same time, the demand from the Women's Self-Help Groups for involving them in farming conversations also started emerging. This was a breakthrough for the APCNF programme, as working with the SHGs created a multiplier effect. SHGs have been at the centre of this spread, playing several roles since then. They were integrated with the champion farmers through the farmer-farmer dissemination via the community resource persons (CRPs). These CRPs are practising Natural farming with more knowledge in Natural Farming and they provide handholding support to those starting the transition. For example, they ensure there is at least one cow for their group to provide manure for the bio-stimulant recipes used by natural farmers. They often work together to make these bio-stimulants.

They provide loans as needed. They help each other in the Natural Farming annual action plans that are an important part of becoming a natural farmer. They support each other to make sure everyone has at least a kitchen garden. They sometimes set up Natural Farming input shops.

Questions to consider:

In many places in Africa, there are strong and numerous women's savings and loans groups and institutions, various management committees, trading cooperatives etc. How can such social capital be harnessed to share learning and advance Agroecology, as well as, for example, draw down climate change adaptation funds, and influence local and national governments and donors?



Government's positive engagement:

The government's support has been critical to the rapid spread of Natural Farming in Andhra Pradesh State.

A succession of Chief Ministers has given their full backing to upscaling Natural Farming. The state has taken relatively isolated NGO programmes and created an integrated statewide programme with this vision:

By 2030, Natural Farming will be practised by all 6 million farming households in Andhra Pradesh.

The key to the programme's success may lie in the Andhra Pradesh government's belief in A) the farmers' knowledge and ability and B) Natural Farming is a viable alternative.

Questions to consider:

Does the same apply in Africa? Will we only achieve widespread Agroecology practice with government backing? If so, how do we get that government backing? Where do we start?

Co-creation of knowledge through a systematic learning programme:

Linked to the institutional architecture of the Self-Help Group movement, RySS has established a well-thought-out system to support the ongoing learning of farmers.

Various community volunteers support a RySS extension team across the state.

These volunteers include champion farmers and other community resource people.

Champion farmers lead the way in demonstrating the viability of Natural Farming on their farms. This provides the basis for a village to transition to Natural Farming. It usually takes 6 to 8 years for a village to make the shift.

During the presentations from Indian colleagues, they went into some detail on all the different support players. The main point to stress here is that they have designed a comprehensive learning support system. This recognises that Natural Farming is much more locally knowledge dependent than chemical farming. Chemical farmers largely follow instructions from above. Natural farmers manage a diverse farming ecosystem, learning from and cooperating with many in their local environment.



Questions to consider:

How can AFSA and its member networks move towards increasingly more comprehensive learning support systems? Family farmers are almost always willing to share ideas and innovations with their neighbours? How can this be encouraged and supported? What can we do to make a shift from the culture in many countries that says that academics and the trainers know more than the farmers? How can field officers be strengthened in participatory facilitation skills, devoting as much time to listening as speaking?

How individual farming households can shift to Natural Farming:

As in the Agroecology movement all over the world, RySS recognises that moving from chemical-based farming to Natural Farming is a transition. To start, farmers must know and believe that Natural Farming has the potential to

- sustain them economically by increasing crop productivity and net incomes,
- reduce dependency on external inputs,
- increase resilience to climate events, and
- improve health.

Based on this understanding, farmers will begin practising the nine principles iteratively, starting with a few principles that are easy to begin with. This may include no use of agrochemicals and introducing a few inoculants, and then gradually shifting to more principles as their confidence increases season after season. Also the farmers are encouraged to start the Natural Farming practice on a small portion of their farms. As their learning curve in the concept and the process increases, they shift to more land and more principles, season after season. They assess the impact and then use the Natural Farming annual action planning process to expand into more crops in a larger area. They also develop an understanding of soil management and pest management. All of this is based on local conditions. They are learning from experience all the time.

This gradual expansion continues until farmers use Natural Farming on their whole farms during all seasons. The transition takes around 3 – 4 years. The programme organises intense hand-holding for new farmers with various learning activities. These include films, group discussions and visits to other farmers' fields to learn from them. Direct training on practices always takes place in farmers' fields.



Attention to monitoring, learning and gathering evidence:

As in all they do, RySS has paid great attention to their monitoring, evaluation and learning (MEL) system.

Overall, the MEL system looks fairly standard. It generates and manages information from farmer to state level and vice versa. The starting point is community monitoring. Their MEL aims to provide 'a basis for evidence-based decision-making', so that the quality of implementation improves.

An impressive number of studies have been completed, and several are currently taking place. Interest in this pioneering programme from around the world has undoubtedly driven this. These studies involve a variety of stakeholders, internal and external.

Natural Farming has had a rough time in India's mainstream scientific community. The claim since the programme began has been that there is not enough evidence to be spreading its practice. The programme's stance has been that as long as farmers find the approach valuable, it is the scientists' job to explain why. At the same time, the programme has undertaken agronomical studies based on tools used for conventional farming called Crop Cutting Experiments (CCEs). This tool generates information about yield and income, comparing natural farmers with those still using chemicals. Both RySS itself and external agencies carry out these CCEs.

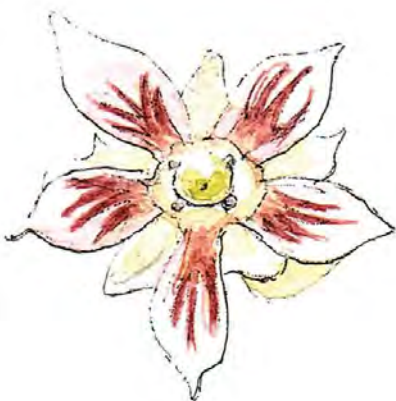
Questions to consider:

How can AFSA build relationships with research institutions, and lobby governments to allocate a greater proportion of research funds to agroecological farming? How can farmers' knowledge be systematically recorded and taken into decision-making at all levels? How do we deal with the tricky question of evidence, doing all we can to gather evidence in support of Agroecology, but not letting a narrow perspective on evidence hold us back?



Other features that contribute to the success of the Andhra Pradesh Natural Farming programme:

- Recognition that farmers are the experts on their own farms. This is important given that Natural Farming is context-specific and depends on farmers' specific local knowledge.
- The programme does not overwhelm new farmers with information and choices. The programme gives them a clear set of guidelines to follow as they enter the world of Natural Farming.
- At the same time, the programme encourages innovation amongst those farmers who have successfully made the transition. For example, farmers who have come up with innovations are encouraged to make a video of this. Each month one of these videos is selected to share across the programme.
- The Pre-Monsoon Dry Sowing (PMDS) is an example of a programme-wide innovation that has been successfully introduced since the programme began.
- The package of practices is revised and spread to others based on the real case examples of the farmers. So knowledge is not top-down like in a lab-to-land situation, but spread horizontally from successful real-world experiences.
- Input shops by local farmer entrepreneurs at the local level promote local economy and services.



How are farmers in Africa faring when putting the nine principles of Natural Farming into practice?

Natural Farming, as the name implies, means farming in tune with Nature. Many alternatives to chemical farming have focused on replacing chemical inputs with natural inputs. This is not the only focus of Natural Farming. Natural Farming restores how the whole natural system works on a farm, particularly in the soil. The nine principles of Natural Farming guide a farmer towards this.

Following the introduction to these nine principles from colleagues in Andhra Pradesh, twelve African organisations (listed at the beginning of the book) offered to share the experiences of farmers they work with in putting these principles into practice.

As readers, you might like to consider your own situation, whether you are a farmer or someone who works with farmers. How well are the 9 Natural Farming principles being put into practice where you are? What is working well, and with what are farmers struggling?

A Summary of African farmers' experiences in implementing the 9 Principles

This section summarises what came up in their presentations.

Two questions were focused on:

1. Which two of the nine Natural Farming principles are farmers you work with most effectively putting into practice?
2. Which two principles are they most struggling with?

Here is a table that gives an overview of their answers to the two questions:

Principle	How many selected this as one of the two more effectively being put into practice?	How many selected this as one of the two more challenging principles?
A. Crop cover - 365-day green cover	-	5
B. Crop diversity	6	2
C. No or low till	1	8
D. Integrate animals	6	1
E. Use of biostimulants	3	-
F. Organic matter addition	2	1
G. Use of local seeds	4	3
H. Pest management	1	4
J. No chemical stress	1	4





A. Crop cover

Aim towards having 365-day green cover

It's only in recent years that science has revealed the contribution that living roots make to healthy soil. However, achieving year-round crop cover is a challenging principle, especially in the drier parts of the continent. To many who come from one-rainy season climates, with long dry spells, it is almost impossible to imagine 365-day green cover. However, this 365-day green cover is being achieved to some extent via the uptake of agroforestry.

This is most evident in a country like Kenya, where Wangari Mathai and others led efforts to bring trees into farmland. Also, in western Kenya and Uganda, some good examples of food forests are developing. ICRAF has been leading agroforestry efforts in many places. One presentation from them highlighted some of the trials they are doing to show the benefits of trees.

Groundswell highlighted Farmer Managed Natural Farming (FMNR) practices in drier parts of West Africa. This has led to trees coming back across huge areas of land in the Sahel. It's one of the African success stories in Agroecology.

Some traditional crops like cowpea and sweet potato tend to extend green cover into dry periods quite significantly. Pigeon pea does this and is used quite widely in countries such as Malawi and Tanzania.

This is a principle that needs lots of planning and experimenting. Much can be learnt from the Andhra Pradesh experiences, where they are forging ahead with this principle, including in dry areas.



B. Crop diversity (including trees)

Include at least 8 – 12 species in any one cropping area

The principle of crop diversity is linked to the role of living roots in making soil healthy. The more diverse the plants, the more diverse the microbes associated with the roots of plants and the healthier the soil will likely be.

Six organisations listed this as an area where there is good progress, and two as an area where they are struggling.

A big push in Africa amongst Agroecology organisations has been to move away from monocrops. Also, almost all traditional practices across the continent were biodiverse, and Agroecology farmers have been drawing on that knowledge to bring diversity back into their fields. Government agents often frown upon what they see as backward 'mixed cropping' practices in countries that have strongly pushed the green revolution.



In the presentations, mixed cropping generally involves inter-cropping with one or two species rather than bringing in a minimum of 8-12 species, as the principle suggests. So, there is much to do to put this principle into practice across the continent.

Increased intercropping is a sound basis from which to work. The challenge is finding suitable crop mixes for specific contexts and times of the year. Ongoing learning from traditional practices will contribute to this, as will various farmer-to-farmer learning activities.



C. No or low tillage

As seen in the table, most farmers struggle with the principle of “no or low tillage”. Colleagues in India confirmed that it has been a difficult principle for farmers in Andhra Pradesh too. The one organisation that did score this here as a more effectively practised principle strongly focuses on conservation agriculture. This approach starts with no-till or minimum till as a basis for farming. Conservation agriculture has gained quite a firm footing in some parts of the continent. This has come out of research showing how mouldboard ploughing reduces soil organic matter very quickly. This is particularly the case in one-rainy season environments where the organic matter oxidises during the long dry months because fields also tend to be bare.

Conservation agriculture is a core element of Climate Smart Agriculture, which is from the 'Sustainable Intensification' group of agriculture models. It is controversial amongst Agroecology proponents because, in many places, it is being used with herbicides, especially glyphosate. Herbicide use seems to be taking off in many places. Many see this as the first step to GMOs, given what has happened in places like the USA, Argentina, Brazil and South Africa.

At the same time, organisations shared that it is difficult for farmers to stop ploughing. Some presenters highlighted how ploughing is a way of life. 'You're not (modern) farming if you do not plough'. It is what you do when the rains come. Beyond that, how do farmers deal with weeds if they do not till? There is also the belief that ploughing helps rain infiltrate better into the soil, even though it often makes infiltration worse.



D. Integrate animals

Have livestock as an integral part of the farming system

This was the principle that scored highest in terms of effectively putting it into practice. Smallholder farmers across Africa have always emphasised a variety of livestock. Agroecology farmers are bringing this back as part of adding diversity to farms.

Livestock can process many materials into valuable manure. This is what farmers turn toward when they want to stop using chemical fertilisers.

Livestock is primarily cattle, goats, and chickens, with camels and guinea fowl found in drier parts of East and West Africa. It can also include pigeons, sheep, turkeys, ducks, and fish in many places too. Smaller livestock is very important to the less well-off farming families. Quite often, for example, cattle ownership is concentrated with wealthier families.

Two organisations in Zimbabwe have introduced a planned grazing approach. This is where livestock owners within a defined area bring their cattle into one herd. They plan and manage the grazing of the herd so that each area has time to recover from the grazing. This avoids over-grazing. This is a new approach, with links to many traditional practices. Think of the way pastoralists in East and West Africa roamed over large areas with their livestock. This approach has great potential but is not easy to implement for various reasons.

Those pioneering this approach are learning a great deal that should help others in future. They also integrate livestock into cropping areas, with night kraals that are moved every 5 – 7 days. This provides in-situ fertilisation with manure and urine. It also breaks open soils that have a hard pan. These movable night kraals are also used in grazing areas on damaged land.



E. Use of bio-stimulants

Select and use appropriate bio-stimulants to speed up microbial life returning to soils

This is a relatively new area of work for most farmers and organisations working with farmers in Africa. AFSA hosted a five-day biofertiliser training programme in Thika, Kenya, in October 2017. Jairo Restrepo, who was involved in the work in Cuba in the 90s to develop various biofertilisers, shared experiences from Latin America. Several biofertiliser training sessions took place in West, East and Southern Africa in 2018 and 2019. Certain practices, such as using 12-day Bokashi (a kind of half-baked, fermented compost), have spread widely since then.

Farmers are also using liquid fermented fertilisers though not to the same extent. Most of the emphasis has been on bio-fertilisers rather than bio-inoculants. The latter seems to be an area that African farmers and organisations can learn from Andhra Pradesh.

What is interesting about the Andhra Pradesh approach is the selection of 3 core biostimulant recipes. Farmers use only these three as they begin their transition to Natural Farming. This gives guidance to farmers in a way that does not overwhelm them with too much choice.



F. Organic matter addition

Increase OM through the addition of dry mulches

Several presenters spoke of the difficulty of finding mulch material. Furthermore, in seasonal rainfall areas where livestock roam freely, they eat all the stover left from crops, or this stover is gathered and stored to feed livestock. Termites eating mulch were also mentioned a couple of times as a reason for this being difficult.

One presenter mentioned farmers using compost as surface mulch in the rainy season.

Last year, Indian colleagues shared that farmers in Andhra Pradesh are now prepared to buy mulch because they recognise its value. This kind of valuing of mulch is not yet present here.



G. Local seeds

Use only local/traditional seeds

There was an interesting division in the scoring here. Four organisations listed this as an area with adequate progress, while 3 said this is one of their most challenging principles. This reflects that organisations are now putting quite a bit of effort into strengthening farmer-managed seed systems, while others have not started on this yet.

The work to strengthen farmer-managed seed systems often involves:

- Farmers holding annual seed fairs at different levels, from local to national, where the focus is to exchange seeds and share knowledge about different varieties.



- Developing household and community seed banks and
- Strengthening the work of seed custodians within communities.

AFSA is involved in much policy-related work around seed. This directly affects farmer-managed seed systems. For example, some countries have now passed seed laws prohibiting farmers from selling their seed if it is not certified. UPOV 91 is increasingly pushing for 'improved' seed across the continent. Farmers' varieties are often seen simply as germplasm and not as seeds.



H. Pest management and I. No chemical stress

Select and use appropriate bio-stimulants to speed up microbial life returning to soils

These two principles are different sides of the same coin, and in both cases, four organisations put them as one of the two principles farmers are most struggling with. This is not surprising. The use of chemicals is an addictive practice. Chemicals are a treadmill from which it is difficult for farmers to escape.

For pest management, the emphasis in Andhra Pradesh is on understanding the life cycle of pests as the basis for controlling them. This has happened to some extent in Africa, for example, via Farmer Field schools.

Most Agroecology practices in Africa focus more on replacing chemical inputs with organic inputs rather than restoring the health of the soil. In Andhra Pradesh, for the replacement of chemical fertilisers, the emphasis is on restoring the health of the soil rather than providing alternative organic nutrients.

There are countless botanical pest management mixtures that farmers across the African continent use, some of these based on traditional practices. These become particularly important in vegetable areas where there tends to be high use of chemical pesticides. But there are also significant losses to pests in cropping areas too. One example of this is striga/witchweed, which can be managed best by improving soil fertility.

Another recent example that has swept the continent is the Fall Armyworm. The best solution for this pest is farm management. This can include having botanical pesticides such as those that are neem-based. A recipe called 'ash brew' has also worked in several cases. Of course, many farmers still have to deal with the plagues of locusts that strike periodically. Another problematic area for pest management is the wide use of chemicals for post-harvest control.

Government Farmer Input Support Programmes (FISPs) handouts of free or highly subsidised chemical inputs and hybrid seeds makes avoiding all chemicals difficult. The Comprehensive Africa Agriculture Development Programme (CAADP) policy to significantly increase the average of 50kg per hectare of chemical fertiliser use in Africa is a further challenge.

One final point is that an increasing number of farmers recognise that the most critical foundation for pest management is healthy soil. This is where many of the other principles come in. Also, crop rotation can play an important role too. It keeps returning to the transition issue of getting off the chemical bandwagon.

Key Challenges and Opportunities in moving forward

Bringing government services and resources on board is critical for Agroecology to become mainstream. Most national extension services lack agroecological experts and agricultural education materials and training are geared toward chemical agriculture. Arranging horizontal learning visits of government decision-makers to engage with their counterparts in Andhra Pradesh may help to shift doubting minds by seeing what is possible.

Another primary challenge for upscaling is developing many more grassroots champions in Agroecology.

Finding opportunities embedded within the challenges

How can regional level advocacy, for example with the African Union, lead to investment in education in Agroecology and natural food consumption?

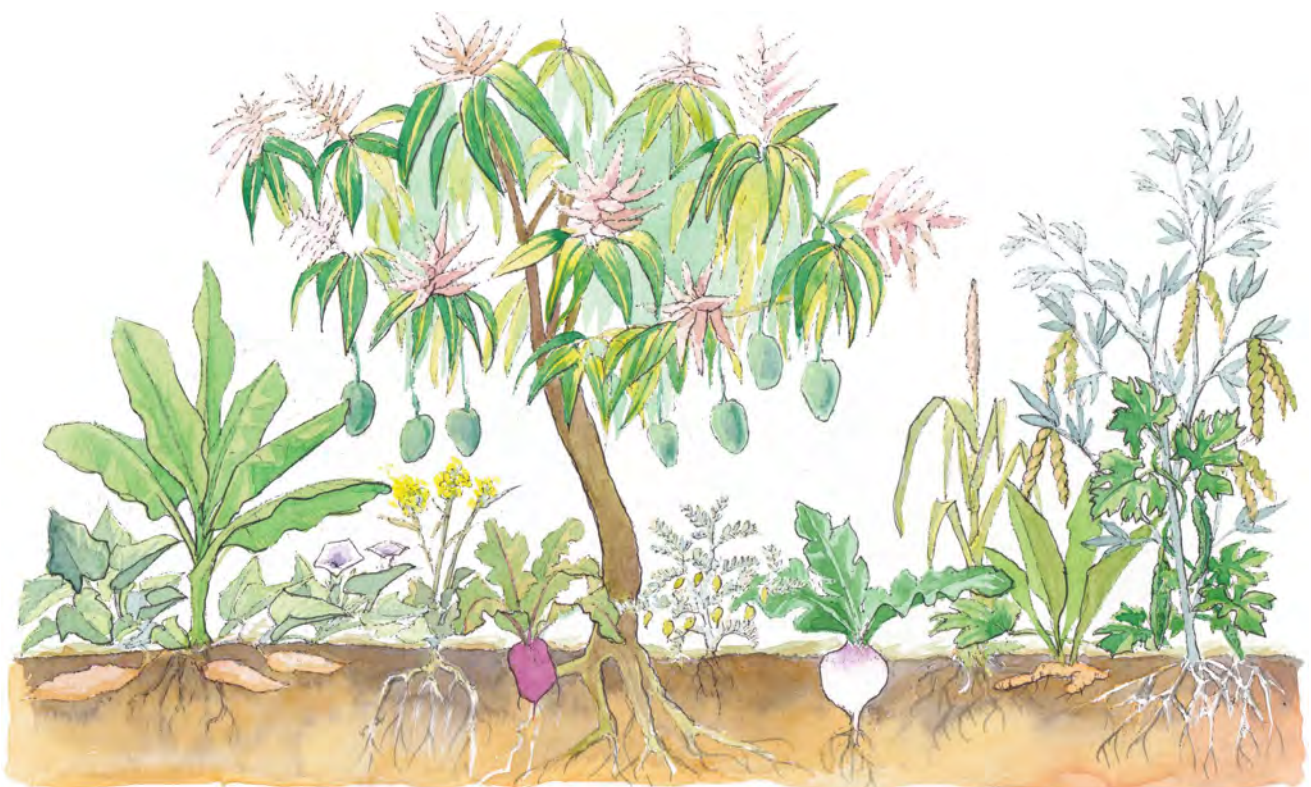
How can NGOs pool their communication efforts even more to get the message out? How can we make joint bids together with local government departments for large-scale communications funds for intensive education campaigns at the ground level?

Where does the potential exist for scaling Agroecology at district, county or equivalent level across the continent? Where is government already leaning towards Agroecology that we can get behind?

How can we unlock the enormous potential in local organisations and institutions, as social capital, to provide life and resources to scale out the practice of Agroecology?

We have illustrated that there are several opportunities for learning from Andhra Pradesh, and the process of the exchange has stimulated action on those learnings already. What have you, the reader, learnt from this booklet? What will you do to promote Agroecology more effectively where you are? Have you ideas or resources to share?

If you are not already doing so, let us know by engaging with AFSA. It is through horizontal sharing and learning that we will succeed together.





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