

Andhra Pradesh Community managed Natural farming - Rythu Sadhikara Samstha, Govt of Andhra Pradesh, INDIA



Vision 2031 - all 6.0 million farmers, and 2.0 million farm workers and 60.0 lakh Ha of farmland

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Farming in harmony with nature – for people and for the planet – a solution for the multiple emergencies



What is **Natural farming** ? It is **mimicking nature**. A holistic land management practice that leverages the **power of photosynthesis** in plants to close the carbon cycle, and build soil health, crop resilience and nutrient density.

APCNF - Universal Principles of Natural Farming

Soil to be covered with crops 365 days
(Living root)

Diverse crops , trees
15 – 20 crops

Minimal disturbance of soils

Integrate animals into farming

Bio stimulants as necessary catalysts

Increase amount and diversity of organic residues

Use indigenous seed

Pest management through better agronomic practices, botanical extracts

No synthetic fertilizers, pesticides, herbicides, weedicides



Microbial Seed Coating

Beejamrutham - cow urine, cow dung, and lime – fermented



Microbial Soil enhancement

Jeevamrutham (bio-stimulant) - cow dung, cow urine, soil, jaggery, pulses flour – mixed and fermented

Bio-stimulants

Scientific appreciation and validation of traditional practices and new findings of Science taken to farmers.

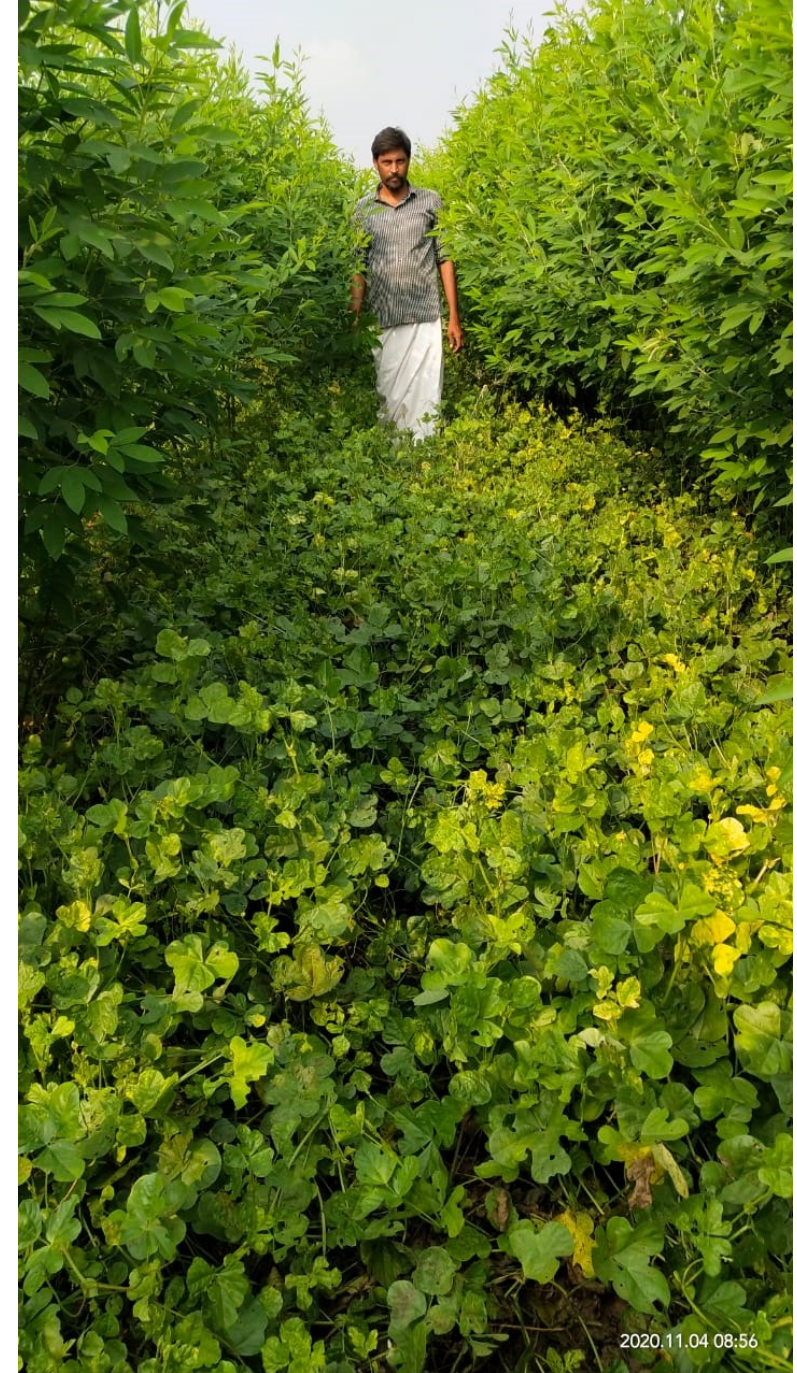
Innovative Farmers are the real drivers of the change process



Crop diversity – poly cropping

Crop diversity is an integral part of the APCNF system.

- **Resilience** from vagaries of weather
- **Reduces** risks, surplus income
- Provides **nutrition diversity**
- **Strengthens** soil structure



Microbial seed coating - Beejamrutham



Ingredients

Cow dung – 2 kg

Cow urine – 2 liters

Lime – 40 grams

Handful of chemical free soil

Water – 20 liters



Step 1

Wrap the cow dung in a cloth and submerge in water and let it soak for 12 hours

Squeeze the cloth after 12 hours, add lime, chemical free soil.



Step 2

Spray the concoction on all seeds and ensuring each seed is coated by it before sowing



Step 3

Soil Microbial enhancement – Bio stimulant - Ghanajeevamrutham



Ingredients

Cow dung - 100 kg

Jaggery - 1Kg

Pulse flour- 1 kg

Cow urine - 10 liters

Hand full uncontaminated soil



Step 1

Mix all the ingredients properly



Step 2

Make cakes and shadow dry for 5 days for fermentation



Step 3

Apply these cakes in the field

2020/6/13 11:53

Soil microbial enhancement – Liquid biostimulant - Dravajeevamrutham



Ingredients

Cow dung- 100kg

Cow urine- 3-6
ltrs

Pulse flour- 2 kgs

Jaggery – 2 kgs

Water- 200 ltrs

Hand full of
uncontaminated
soil



Step 1

Add all the ingredients and mix them thoroughly – for a few minutes, twice a day



Step 2

Keep it fermented for 5 days. The colour and smell changes.



Step 3

Spraying of Dravajeevarutham in the field



Pest management through botanical bio stimulants



Yellow and blue sticky traps



Preparation of *kashayams*
(bio-innoculants for pest
management prepared from
local ingredients)



Scale of APCNF programme

3 to 5 years for a farmer to transit from conventional agriculture to Natural farming

Target

86% - small and marginal farmers. 1 ha per capita



40,656 farmers
704 (v)

2016-17

480,000 farmers
3730 (v)
220,000 Ha

2020-21

27% of villages
12% of farmers
4% of area

630,000 farmers
3730 (v)
290,000 Ha

2021-22

81% of villages
17% of farmers
7.5 % of area

1,060,000 farmers
10,778 (v)
460,000 Ha

2022-23

100% villages
31% of farmers
14% of area

1,900,000 farmers
13,371 villages
840,000 Ha

2023-24

Largest Natural farming programme in the country, in terms of farmers enrolled.

No cash incentives during transition – and also no promises of market premia after transition

Source of Funds: Govt – PKVY, BPKP, , KfW loan – Rs.1800 crs (235 million USD) upto 2024

Grant: Azim Premji Philanthropy – RS.100 crs (14 million USD) upto 2022

APCNF IMPACTS

Cost of cultivation - significant reduction - NF costs are much lower than non-NF, across all crops

Yield differences are not significant between NF and Non-NF farms

Significant increase in net income for NF farmers

Independent Assessment by I.D.S

6 seasons till now - 2018-19 (2 seasons) and 2019 – 20 (2 seasons) , Kharif 2020 and Rabi 2020-21 (2 seasons) .

Awaiting 2021-22 (2 seasons) assessment reports.



NF farms reported better soil health, crop health, resilience, economic empowerment of farmers and dignity of labor.

The report also mentioned that APCNF has higher potential for expansion of extension services by way of increasing CRPs at the village level

SUMMARY RESULTS FOR KHARIF 2020-2021

	Yields (Quintal/ ha)			Gross-returns (Rs./ ha) under			Paid-out costs (Rs./ ha) under			Net-returns (Rs./ ha) under		
Crop	CNF	Non-CNF	% change	CNF	Non-CNF	% change	CNF	Non-CNF	% change	CNF	Non-CNF	% change
Paddy	53.95	51.75	4%	99,293	94,693	5%	46,125	61,301	-25%	53,168	33,392	59%
Groundnut	22.12	19.59	13%	96,439	69,051	40%	46,540	48,448	-4%	49,899	20,602	142%
Cotton	12.45	10.96	14%	63,631	55,622	14%	35,797	49,952	-28%	27,834	5,670	391%
Black gram	9.86	11.27	-13%	76,172	52,159	46%	17,705	25,186	-30%	58,467	26,973	117%
Red gram	7.42	7.33	1%	63,506	34,688	83%	13,305	23,489	-43%	50,201	11,199	348%
Ragi	18.56	12.27	51%	62,236	41,620	50%	23,840	36,947	-35%	38,396	4,673	722%

* CNF sample HH- 1140, Non - CNF sample HH -646

NF farmer – 2.2 years
experience

SUMMARY RESULTS FOR RABI 2020-2021

Crop	Crop yields (Quintal/ha)			Gross-returns (Rs./ ha) under			Paid-out costs (Rs./ ha) under			Net-returns (Rs./ ha) under		
	CNF	Non-CNF	% change	CNF	Non-CNF	% change	CNF	Non-CNF	% change	CNF	Non-CNF	% change
Paddy	62.56	57.11	10%	104967	90811	16%	43760	52029	-16%	61207	38782	58%
Groundnut	36.23	25.61	41%	2,08,215	1,30,637	59%	39,929	57,143	-30%	1,68,286	73,494	129%
Black Gram	12.97	13.05	-1%	84,836	84,290	1%	18,246	25,714	-29%	66,590	58,576	14%
Maize	75.86	63.01	20%	1,19,010	93,122	28%	39,819	43,598	-9%	79,191	49,524	60%
Green Gram	12.64	10.27	23%	77,919	62,820	24%	19,310	26,692	-28%	58,609	36,128	62%

* CNF sample HH- 800, Non CNF sample HH -494

NF farmer – 2.2 years
experience

Food and Nutrition diversity

Aim to include 5-7
food groups in the
household diet

Universal coverage strategy

**Focus on landless,
farmworkers**

Target for 2022-23: 0.5 million



Homestead gardens – Mini food forest in one's own backyard



Improved Biodiversity





Average number of Earthworms per square meter in Natural Farming plot is 46.83 as compared to conventional plot where it is 5.71



Increase in Beneficial insects



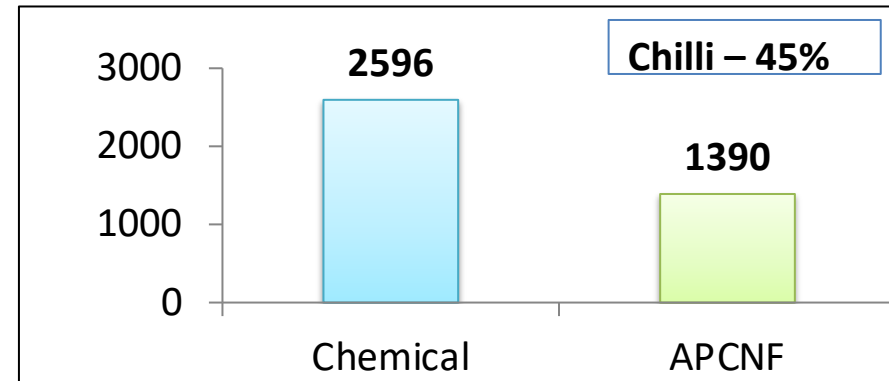
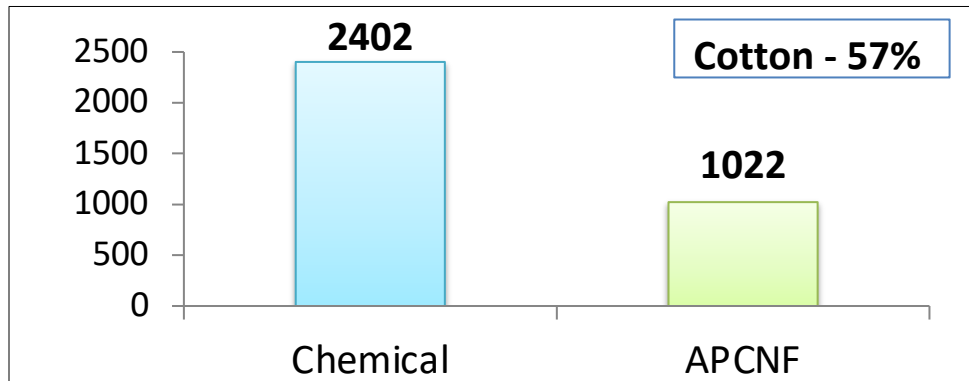
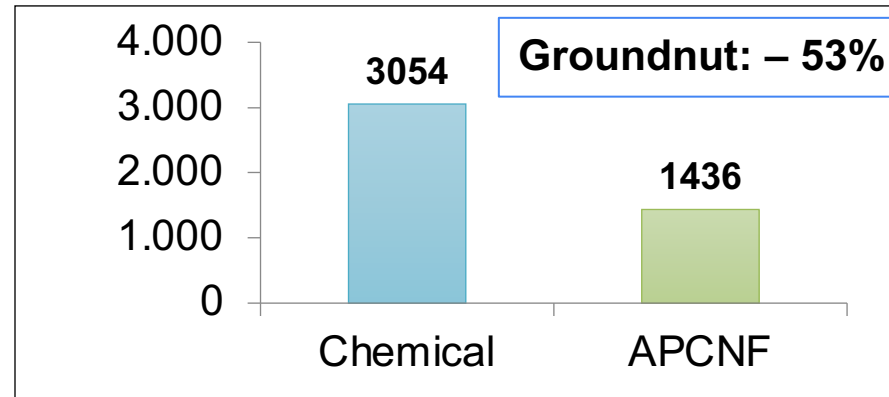
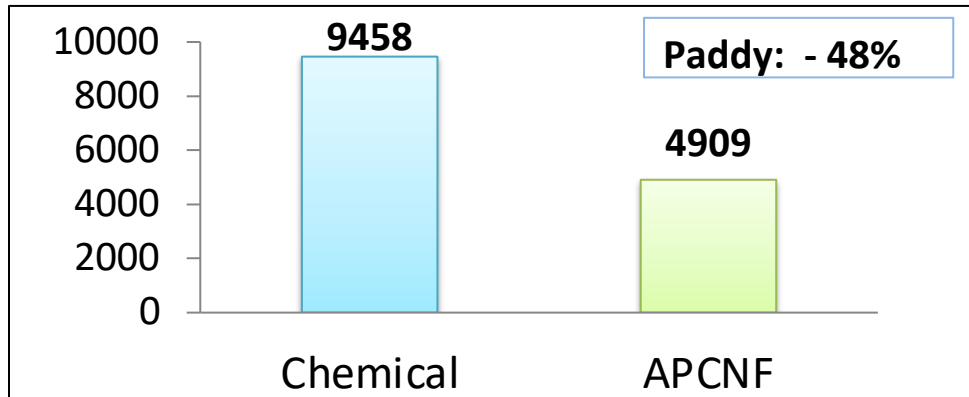
Significant increase in birds nest and birds visiting Natural Farming fields

Resilience to floods :

NF Farmers have experienced less damage compared to other farmers



Water consumption in one cropping cycle 2020-21 (RySS – internal study)



Y-axis = Water consumption in kilolitre

2 External independent studies:

1. ASCI – Core Carbon X

2. WALAMTARI Ministry of Water Resources

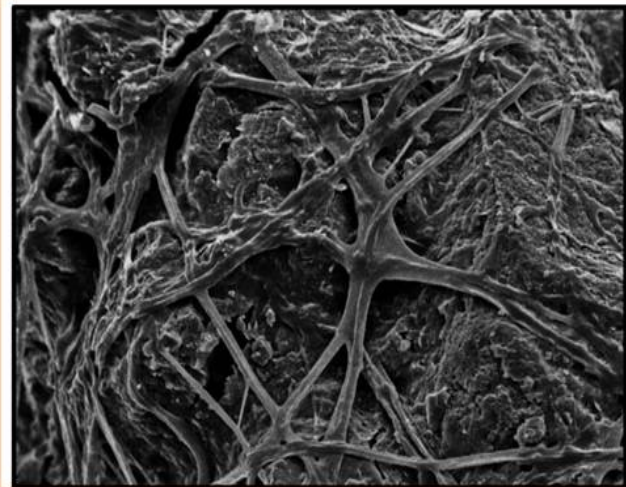
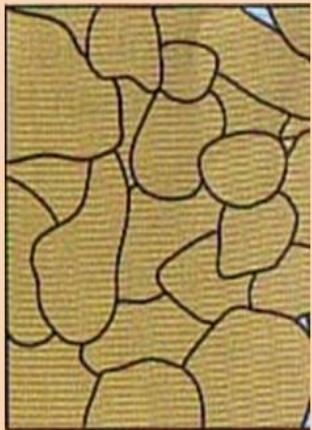
Drought proofing and 365 days green cover in Semi arid areas - M.Vannuramma of Palvoi village, Anantapuramu has transformed one acre of wasteland into a productive farm



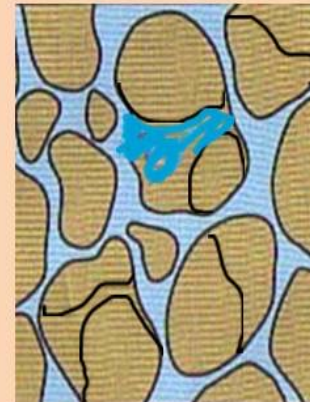
Soil structure and water conservation - building sub soil reservoirs

Soil aggregation

Non porous and non-permeable



Porous and permeable with connected pore spaces



Fungal hyphae, bacteria & root exudates glue together the soil particles
(Electron microscopic image)



Soil Aeration

- Water infiltration
- Water holding
- **Water vapour harvested for irrigation**

1. Pre-monsoon dry sowing

- Sowing before Monsoon
- April onwards
- Effectively utilize the moisture available in the atmosphere

2. Rabi Dry sowing

- Sowing during dry-periods – throughout the year
- Dry situations regardless of regular monsoon
- Helps to maintain year-round ground cover in all districts





16th Nov 2019 - Mr. Walter Jehne, Soil- Microbiologist, Australia, visiting the PMDS field

Scaling up of Pre – Monsoon Dry Sowing breakthrough – harnessing water from the air



	PMDS 2018	Rabi Dry Sowing 2018	PMDS 2019	PMDS 2020	P.M.D.S 2021	P.M.D.S 2022
Number of farmers	11 (Pilot)	1383	21,635	103,340	348,000	10,00,000
Area covered (in acres)	11 acres	885	13,068	80,409	353,000	10,00,000

Extension of PMDS to 365 days green cover (PMDS + APCNF) – for drought proofing, reversing desertification, increasing cropping intensity - from Anantapuramu District

365 DGC - Pilot started in 2020 with 110 farmers, in Anantapuramu. Expanded to 1000+ farmers in 6 districts, in 2021. The target for 2022 is 10,000 in all 13 districts.



1. Farmers are getting incomes, on a monthly basis through out the year, from semi arid, rainfed lands.
2. They are getting around **Rs.100,000 per acre net income** from these rainfed lands.
3. This is 3 to 5 times higher than when they were practising conventional agriculture.
4. They are able to restore degraded lands and lands which were fallow for more than 5 years

3 crops in an year in semi arid, dry lands

Ananthapuramu District Cropping Pattern based on Agro Ecological Zones													
Agro Ecology zones		Aprl	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
		PMDS Window			Kharif window			Rabi Window					
Redsoils	I	Millets and pulses other 22 types crops			Groundnut & other 21 types crops			Vegetables & others 35 types					
Blacksoils	I	Millets and pulses other 22 types crops		Cotton /Bengalgram & 21 types crops					Vegetables & others 35 types				

PMDS CHAMPION FARMER, ANANTAPUR DISTRICT

Name : S.SREEDEVI
Designation : CRP - farmer trainer
Village : Pesarakunta
Unit/Cluster : Hampapuram
Mandal : Rappthadu
Division : Ananthapuramu

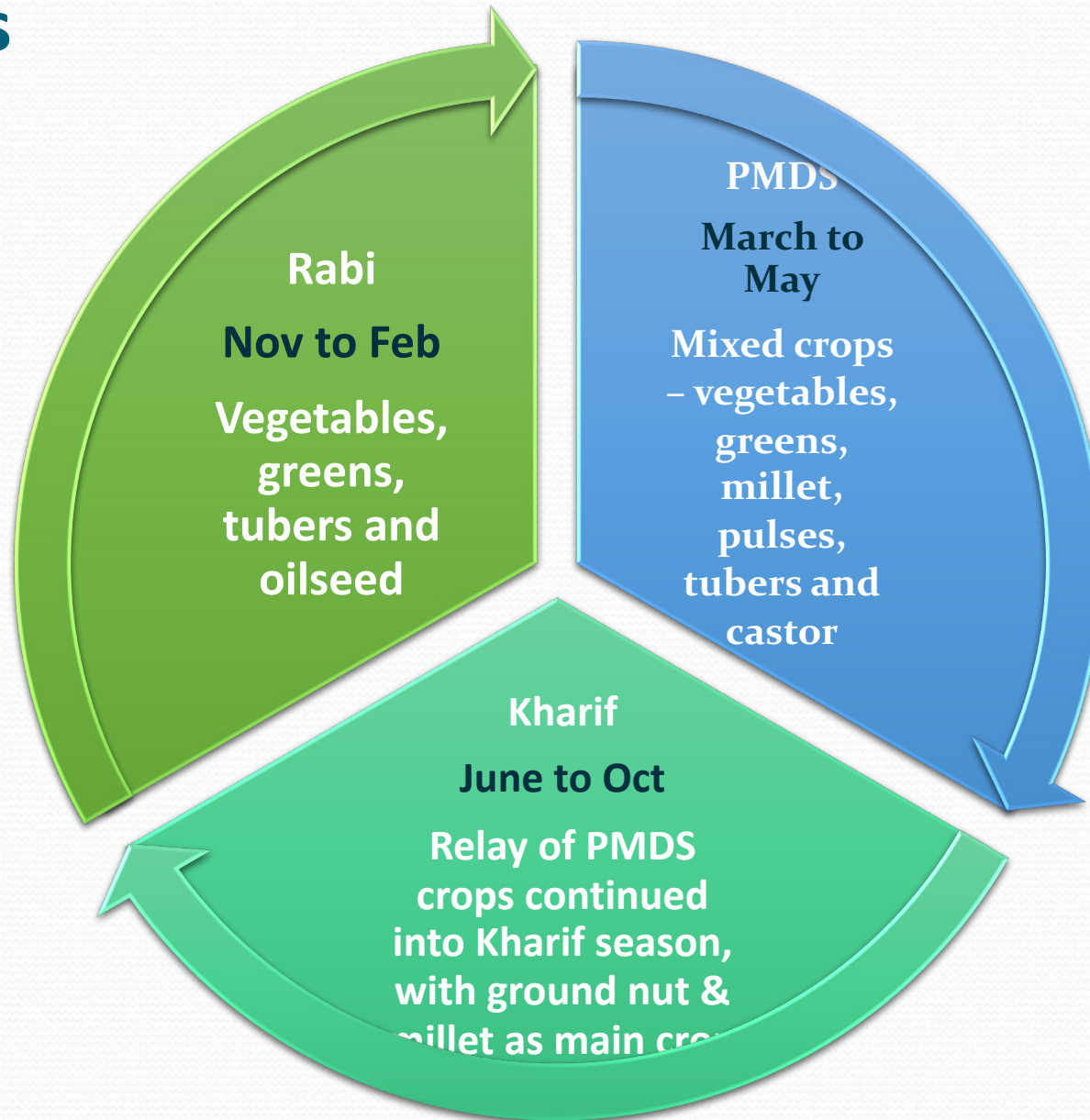
Meet Sreedevi, an inspiration to other women in her community.

She is a farmer, mother, SHG member and CRP, who helps other farmers transition to Natural Farming.



She practices PMDS on 1 acre of dry red soil, growing a mix of crops ranging from ground nut, castor, ladies finger, tomato and is a completely rain fed farmer

3 Cropping seasons in rainfed lands - a boon for rainfed farmers in semi arid areas



Basic details PMDS Vegetable model

- 1 acre, rain fed red soil.
- Model: PMDS line sowing
- Used water tankers in 3 months (March, May, January) to maintain crop; 2 tankers per application – 2 mm each time
- **Date of sowing : 6/4/2021**
- **Date of Germination: 13/4/2021**
- No of types of crop seeds sown: 22
- Mulching material used :
Groundnut husk, millet crop residues
- Frequency of mulching: 3/Year
Summer – March & May, Rabi: October



23.05.21

Inputs - Procurement of mulch material



- Mulch Material here: dried millet stalk, ground nut plant remains and crop residues.
- Cost/ tractor load: Rs 450. Two loads used for the same.



Mulching material being spread evenly .



- Total quantity used per load - 1.5 to 2 tonnes
- Average total mulch used per year - 4.5 to 6 tonnes
- Mulch thickness maintained - 3 to 5 inches

Seed pelletization : Critical part of Summer sowing, PMDS



Seed pelletization: Seeds are coated with a mixture of sifted GJM, field soil, ash, lime, with sprinkling of water.

The resulting pellet is 10 times the size of the original seed.

The seed pellet protects the seed, allows for moisture retention and favorable conditions for seed germination



Navdhanya seed mix, consisting of 9 pulses and legumes

The image below: process of pelletization. It is a snapshot of a YouTube video which demonstrates the same.



<https://www.youtube.com/watch?v=Ckeqfc2NCY&t=504s>

Crop progress



Almost ready for a harvest, Sreedevi's field looks like a mini forest, rich with multiple types of nutritious produce, in the month of May



**Overall harvest of green chilli, tomato,
brinjal, field beans, radish, ladies
finger on
25.02.22**



YIELD / INCOME PARTICULARS - 2021-22

	Premonsoon Window			Kharif window				Rabi window				
	Apr*	May*	June*	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total
Leafy vegetables	540	530	605	620	405	460	520	725	300	300	1000	6005
Marie gold			1150	2280	7500					2125		13055
Bajra				12680								12680
Field Bean					15600	8320	5880	1020	2500	400	700	34420
Cowpea			1044	1425	1875	2200	1740	670	2200	1062	500	12716
Castor			200	320	600	750	1000	1600	2250	2600	2000	11320
Groundnut							33459					33459
Red gram									23430			23430
Radish					1890	1560		1200	800		1350	6800
Tomato									1014	1100	1815	3929
Okra									1800	3300	650	5750
Chilli									2250	2680	2250	7180
Brinjal									1625	2080	1000	4705
Carrot										2275		2275
GROSS INCOME	540	530	2999	17325	27870	13290	42599	5215	38169	17922	11265	177724
EXPENDITURE	3515	1370	1220	5610	1450	1550	4400	830	800	750	1100	22595
NET INCOME	-2975	-840	1779	11715	26420	11740	38199	4385	37369	17172	10165	155129

**Incomes incurred are from relay crop of the previous season*

**This farmer cultivates 18+ varieties of PMDS crop on
May**





Anantapuramu - Dryland agriculture – tree crops in poor soils

Surendra Reddy
He cultivates on salty, alkaline soil.

Thanks to using bio inoculants and letting nature take over, he now has a productive, high yielding field

Agro biodiversity of crops on Surendra's field



Impacts of 365 DGC in Anantapuramu

1. Farmers are getting incomes, on a monthly basis throughout the year, from semi arid, rainfed lands.
2. They are getting around Rs.100,000 lakh per acre net income from these rainfed lands.
3. This is 3 to 5 times higher than when they were practising conventional agriculture.
4. They are able to restore degraded lands and lands which were fallow for more than 5 years
5. There is no migration on account of crop failures

APCNF Implementation – overcoming obstacles through critical innovations

Challenges



Farmers' Mindset – Agriculture cannot be practiced without chemicals



VESTED INTERESTS



Taking it to every farmer



Handholding until full adoption



Poor extension system



Self sustaining, long-lasting

Government support and advocacy – resources and implementation

Knowledge – POPs, videos, etc
Research
Innovations and continuous learning

Social capital - Women SHG s and federations

Unique innovations of Govt of A.P and pro farmer policies and welfare measures, across the value chain.
Rythu Bharosa Kendram – farmer service centres – one stop shop

Human capital
Farmer to farmer – extension system, Knowledge intensive

Facilitating organizations – Govt., NGOs and C.B.Os

Collaborations with Global and National institutions and Scientific experts



Key role of Government of AP

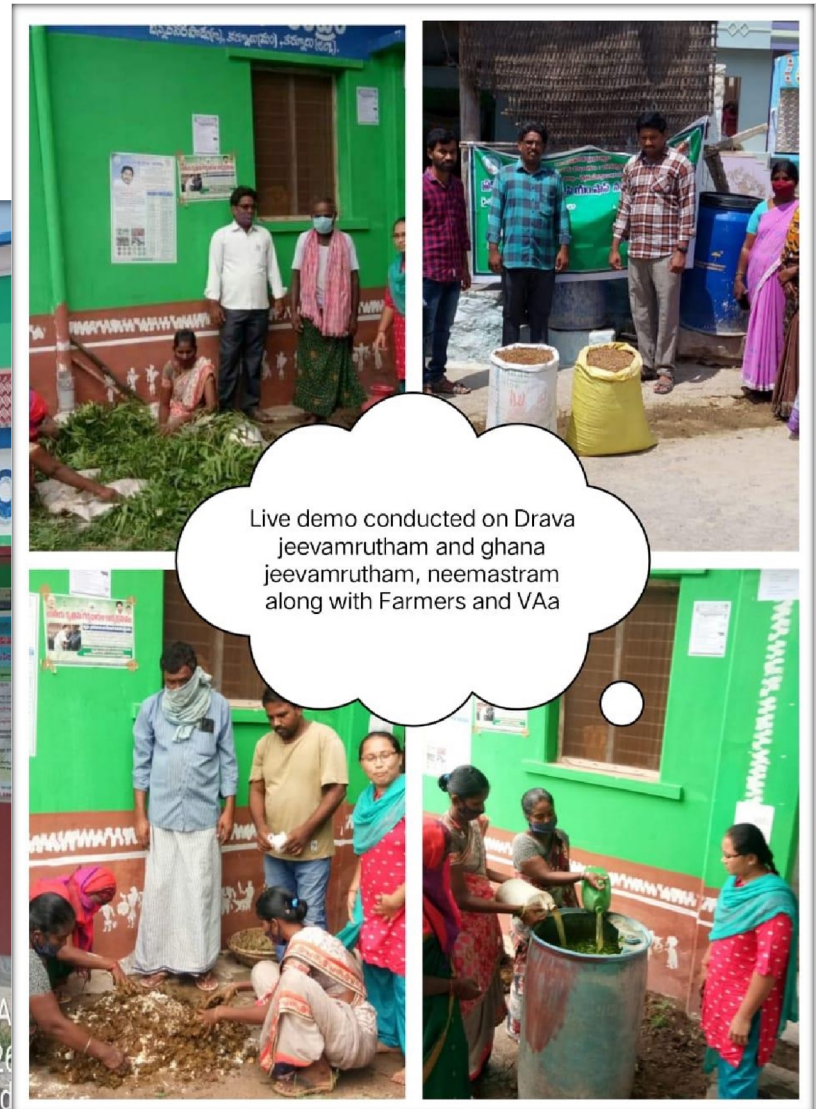
- Government Vision is very important. A.P Govt's vision is to reach all villages and transform 51 lakh (85%) farmers by 2031.
- Govt support:
 - Separate dept for Natural farming, within Agriculture Dept
 - Dedicated Implementation SPV – RySS
 - Technically strong human resources at different levels – state, district, and cluster
 - Village Farmer Service centres as the nucleus for knowledge sharing, input sourcing, etc.
 - Financial resources
 - Project implementation period is flexible – whatever time it takes to transition every farmer in the village
- Reorientation of Agriculture Dept staff



Preparation of Agnastram in East Gangavaram RBK, Talluru Mandal, Prakasam District.



Preparation of Sontipalla Kashayam at RBK, Talluru Mandal,Prakasham district.



Method demonstration of Jeevamrutham at RBK, Kurnool Disrtict.

Women in Natural Farming: Our biggest Strength



Programme
Management,
transparency

Collective
Action

Peer Learning

140,000 women SHGs and their 5386 Federations are in charge



Farming Plans,
and,
consumption
plans

Inclusive of
the poorest

Farmer 'heroes' central to the programme

A Knowledge intensive and not input intensive programme

Most effective dissemination is "farmer to farmer"

Best practicing farmers, Community resource persons (CRPs) engaged to take NF to other farmers.

APCNF identifies such champions in the community and capacitate them



Inspiration

Knowledge Transfer

Handholding

Video Dissemination

Farmer Field Schools

10,000 Community Resource Persons @ 1/100 farmers

150 Young Agriculture Graduates as Natural Farming Fellows – after 2 years have graduated to trainers and researchers at district and state level



Data Collection

Data Management

Data Analytics

Decision Making

Information & Communication Technologies (ICTs) in Natural Farming

Changing a farmer means changing entire village

All Villages

All Farmers

All Farms

All Practices

Farmer Transformation

450 farmers in a Village

Village Transformation

Year 5 : High end models

Year 4: full area

Year 2

Year 1

Each farmer takes 5 years to cover entire holding.

Transformation Cost to cover 85% farmers and over 85% area is @ Rs. **15000/farmer** over 0+7 years

10 -15% farmers

Year 1

35- 50% farmers

Year 2

>80% farmers

Year 3

100%

In 5 to 8 years, a village becomes a 'BIO-VILLAGE'

Year 8

Research studies in collaboration with International research organisations

- **CIFOR- ICRAF** : LDSF, GHG Comparison
- **CIFOR - ICRAF and Climate works**: Exemplar Landscapes in Andhra Pradesh
- **University of Reading** : Comparing production system (APCNF vs Organic vs Conventional)
Phase 2 - Supported by KFW
- **U.N.F.A.O** - FFS, Foresight Study Studies
- **Walter Jehne, Australian Climate Scientist** – PMDS, 365 DGC
- **CIRAD** - Foresight Study
- **Cambridge University** - PhD Study on APCNF impact on Pollinators
- **Tufts, Wood Hole Institute, USA** - Long term panel studies to track the soil health and Yields
- **James Hutton Institute** - Study on Nutrient Dynamics – PhD thesis
- **University of Edinburgh** - BLOOM study to assess health and nutrition impact of NF food
- **Global Alliance For Future of Food and GIST** – TeebAgri framework, true cost accounting for Natural farming food
- **IWMI – BIOVISION** – comprehensive impact assessment of natural farming (to start in 2022)



Research studies in collaboration with National research organisations

- Comparative analysis of Water and Energy use reduction in APCNF vs Chemical farms – **WALAMTARI**
- Savings on Fertiliser subsidies - **CEEW** (Council for Energy, Environment and Water) and **SIFF** (Sustainable India Finance Facility), India
- **Zero Budget Natural Farming for Sustainable Development Goals**, Andhra Pradesh - CEEW
- Life Cycle Assessment of ZBNF and Non-ZBNF- a study on Energy and Water **C-STEP**
- Comprehensive Survey for Assessing the impacts of ZBNF in AP – **CESS, IDS**
- Research studies on Validating the APCNF practices : ANGRAU
- Impact of 365 Days Green Cover : Indian Institute of Farming System Research (IIFSR: ICAR)



Comprehensive collaboration with ANGRAU

1. Research in each RARS - comparison between NF and conventional – for all major crops – in farmers' fields and in the Research station
2. Special studies – 365 days green cover, water savings
3. Awarding scholarships for 10 PhDs and 25 MSc candidates for doing research in natural farming
4. Demonstration in each KVK

To be done :

Changes in the University curriculum to include natural farming.

In-house studies

1. Comparative analysis of Water use reduction in APCNF vs Chemical farms -
2. Comparing Earthworms population in APCNF fields and Chemical fields-Science team
3. Climate Resilience of APCNF from Cyclone –Science team in RySS
4. Bird population in APCNF farms versus Chemical farms
5. Climate resilience of APCNF to heavy rains
6. Impact of Atavi Chaitanya dravanam, liquid and Solid Jeevamrutham
7. Impact of modified Saguna Rice Technology on water reduction and yields of Paddy
8. Impact of Dry paddy on growth and yield of Paddy
9. Impact of liquid and Solid Jeevamrutham intervals
10. PMDS and its impacts on growth and yield of different crops –PMDS +ZBNF, only ZBNF and Chemical Paddy

Summary of findings from few important studies

- University of Reading: There is no yield penalty in APCNF and APCNF outperforms organic and conventional farms (Published data)
- Land Degradation Surveillance framework: **40 to 60% of the lands in AP are degraded**, low tree density (only 53 species dominating, High run-off in chemical farms compared to Natural farms)
- GHG emissions: The greenhouse gas emissions are 23% to 60% lower in APCNF farms when compared to chemical farms (Published data)
- Water study: APCNF uses 50 to 60 % less water and less electricity when compared to conventional farms (internal study)
- CESS / IDS Study: The net incomes are 62 % higher in APCNF when compared to conventional farms
- Increase in biodiversity in NF fields



Indo-German Global Centre for Agroecology Research and Learning (IGGCARL)

Outlay of 222.4 crores over 5 years –
Grant from Govt of Germany – 174
crores

IGGCARL 2022-27

Key Indicators

IGGCARL's 5-year key indicators include:

10,000 farmer researchers and scientists with their fields as learning landscapes; transforming all villages to climate resilient villages

1000 professional interns; and

100,000 certified champion learners to extend extension and scaling-up

Influencing at least 5 states and 2 key policy changes,

Transformation Cost

#	Categories	COSTS (Rs.)	%
1	NF Capacity building	11,600	77%
2	Support to Community Institutions	1,315	9%
3	PGS Certification, Quality Assurance, Tracking and Monitoring	1,785	12%
4	Technical Support and Overall Programme Management at the District and State levels	300	2%
	TOTAL	15000	

Cost to convert one farmer: Rs. 15000 over 8 years

Benefits to Govt finances from Natural farming - subsidy reduction and avoidance

Year	Land Lakh Ha.	Electricity savings, Rs. Cr (25% savings)	Fertilizer subsidy Savings, Rs. Cr
21-22	2.64	94	188
22-23	7.92	302	604
23-24	15.18	619	1,239
24-25	23.43	1,023	2,045
25-26	30.36	1,418	2,836
26-27	38.94	1,946	3,892
27-28	44.88	2,400	4,800
28-29	50.82	2,908	5,815
29-30	55.11	3,374	6,748
30-31	60.06	3,934	7,869
Total	60.06	18,018	*36,035

* This is based on prices prevailing in 2020

Bringing into cultivation Vast areas of arable lands are fallow (2017 – 18)

The APCNF Promise

District	Fallow	sown	Total Fallow + sown	Fallow as % of total	Ratio
Y.S.R Kadapa	3.51	3.36	6.87	51%	1.04:1
Nellore	3.26	3.37	6.63	49%	0.97:1
Chittoor	3.79	3.62	7.41	51%	1.05:1
Prakasam	4.11	5.39	9.5	43%	0.76:1
Anantapuram	5.46	7.93	13.39	41%	0.69:1
Vizag	1.63	2.81	4.44	37%	0.58:1
Kurnool	3.15	8.51	11.66	27%	0.37:1
Vizianagaram	1.14	2.73	3.87	29%	0.42:1
Guntur	1.81	5.87	7.68	24%	0.31:1
E Godavari	1.49	4.12	5.61	27%	0.36:1
Krishna	1.3	4.24	5.54	23%	0.31:1
Srikakulam	0.71	3.06	3.77	19%	0.23:1
W Godavari	0.82	3.93	4.75	17%	0.21:1
State	32.18	58.94	91.12	35%	0.55:1

APCNF offers a pathway for reversing this

Dryland crops can become assured crops, and even 3 crops can be taken

Cropping intensity to increase to 2.5 +

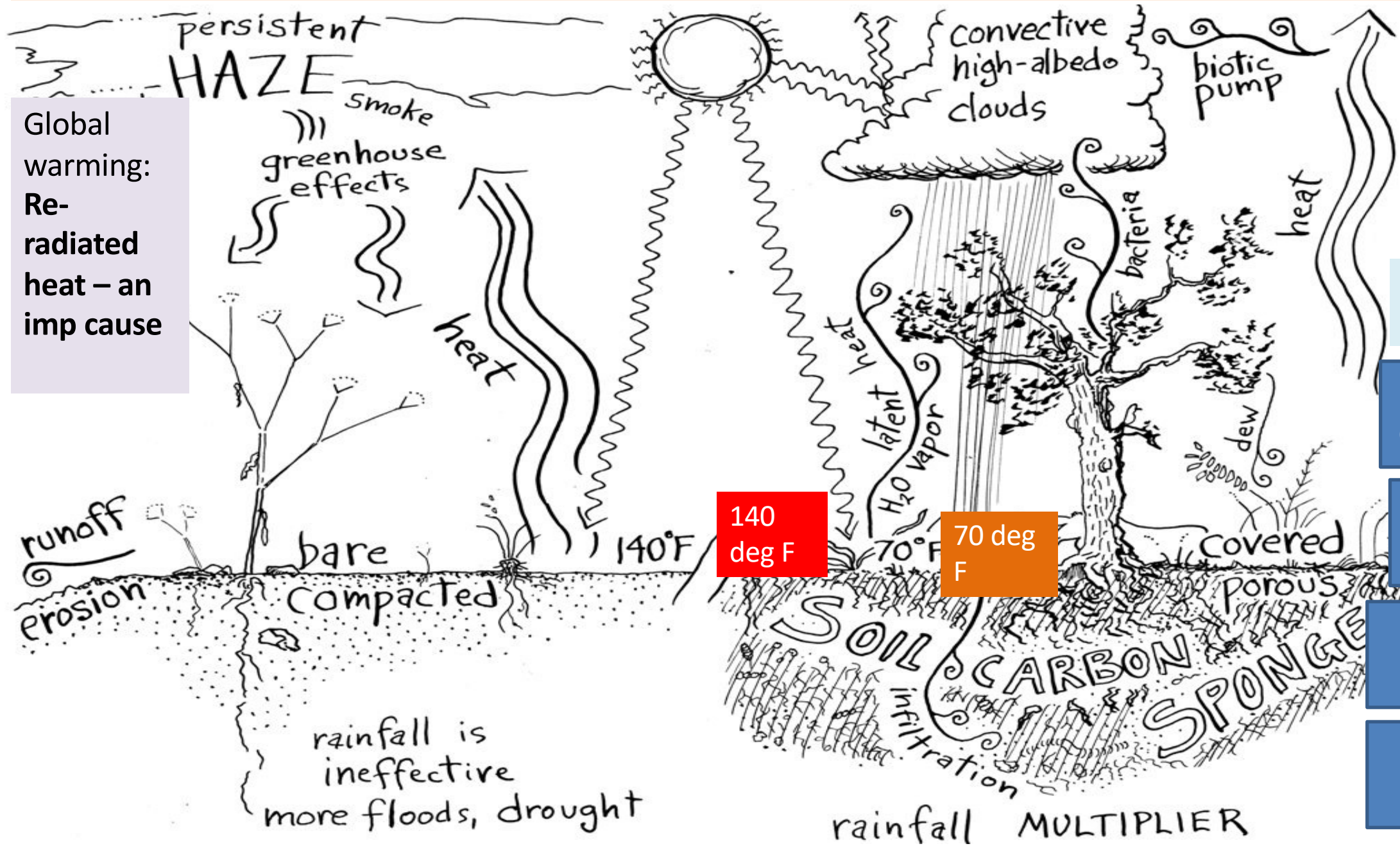
Barren and Fallows can be minimized

Vision: To double the Cropped Area



Natural farming and 365 days green cover can cool the planet

Global warming:
Re-radiated heat – an imp cause



NF + 365
DGC

Reversal of
desertification

Soil / Water
conservation

Food and
nutrition
security

Income
generation



“..We do not inherit the earth from our ancestors, we borrow it from our children..”

LET US ALL ACT NOW



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