CSE – NATIONAL CONCLAVE
Holistic benefits of non-chemical agriculture – productive, profitable and sustainable - lessons from A.P Community managed natural farming

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What is Natural farming? It is 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.
**Universal Principles of Natural Farming – mimicking nature**

- **Soil to be covered with crops 365 days (Living root)**
- **Diverse crops, trees 15 – 20 crops**
- **Integrate animals into farming**
- **Microbial Seed Coating**
  - *Beejamrutham* - cow urine, cow dung, and lime – fermented
- **Minimal disturbance of soils**
- **Bio stimulants as necessary catalysts**
- **Increase amount and diversity of organic residues**
- **Pest management through better agronomic practices, botanical extracts**
- **Use indigenous seed**
- **Microbial Soil enhancement**
  - *Jeevamrutham* (bio-stimulant) - cow dung, cow urine, soil, jaggery, pulses flour – mixed and fermented
- **Bio stimulants - unique strength in Indian Agriculture – reduce the transition period**
- **No synthetic fertilizers, pesticides, herbicides, weedicides**
Nutrient Cycling in Nature

Results:

1. Soil carbon sequestration
2. Greater water holding (+1 gm carbon -> +8 gm water)
3. Efficient Nutrient absorption mechanism
4. Mycorrhizae and other microbes create soil structure
5. Increase in soil porosity – 50% 60% air

40% of Plant Sugars stored in Above Ground Biomass
30% of Sugars stored in Roots
30% of Sugars moves into the Soil as Exudates, feeding vast microbial population
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

Soil Aeration

- Water infiltration
- Water holding
- Water vapour harvested for irrigation
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
Cowpea and field beans grown as intercrops in Mango orchard
## Microbial seed coating - Beejamrutham

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow dung</td>
<td>2 kg</td>
</tr>
<tr>
<td>Cow urine</td>
<td>2 liters</td>
</tr>
<tr>
<td>Lime</td>
<td>40 grams</td>
</tr>
<tr>
<td>Handful of chemical free soil</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>20 liters</td>
</tr>
</tbody>
</table>

**Step 1**
Wrap the cow dung in a cloth and submerge in water and let it soak for 12 hours.

**Step 2**
Squeeze the cloth after 12 hours, add lime, chemical free soil. Mix well in clock wise direction.

**Step 3**
Spray the concoction on all seeds and ensuring each seed is coated by it before sowing.
Soil Microbial enhancement – Bio stimulant - Ghanajeevamrutham

**Ingredients**

- Cow dung - 100 kg
- Jaggery - 1 Kg
- 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
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 in clockwise direction.

**Step 2**
Keep it fermented for 5 days. The colour and smell changes. Keep mixing it in between.

**Step 3**
Spraying of Dravajeevarutham in the field.
Pest management through botanical bio stimulants

Preparation of *kashayams* (bio-innoculants for pest management prepared from local ingredients)
- 7 active biodiversity blocks
- Conserved and characterized 400 traditional varieties
- Promotion of agri-biodiversity resource centre
- Supply of seed kits for undertaking PMDS, kitchen garden etc
APCNF programme at a glance

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

No cash incentives during transition

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

2021-22
480,000 farmers
3730 (v)
220,000 Ha

2020-21
440,000 farmers
3011 (v)
180,000Ha

2019-20
40,656 farmers
704 (v)

630,000 farmers
10,778 (v)
290,000 Ha

Source of Funds: Govt, KfW loan – Rs.1800 crs (235 million USD) upto 2024
Azim Premji Philanthropy – RS.100 crs (13 million USD)upto 2022

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

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

1,060,000 farmers
460,000 Ha

2022-23

100% villages
31% of farmers
14% of area

100% villages
81% of villages

6 million farmers. 86% are small and marginal farmers. 1 ha per capita

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

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**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Yields (Quintal/ ha)</th>
<th>Gross-returns (Rs./ ha) under</th>
<th>Paid-out costs (Rs./ ha) under</th>
<th>Net-returns (Rs./ ha) under</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CNF</td>
<td>Non-CN</td>
<td>% change</td>
<td>CNF</td>
</tr>
<tr>
<td>Paddy</td>
<td>53.95</td>
<td>51.75</td>
<td>4%</td>
<td>99,293</td>
</tr>
<tr>
<td>Groundnut</td>
<td>22.12</td>
<td>19.59</td>
<td>13%</td>
<td>96,439</td>
</tr>
<tr>
<td>Cotton</td>
<td>12.45</td>
<td>10.96</td>
<td>14%</td>
<td>63,631</td>
</tr>
<tr>
<td>Black gram</td>
<td>9.86</td>
<td>11.27</td>
<td>-13%</td>
<td>76,172</td>
</tr>
<tr>
<td>Red gram</td>
<td>7.42</td>
<td>7.33</td>
<td>1%</td>
<td>63,506</td>
</tr>
<tr>
<td>Ragi</td>
<td>18.56</td>
<td>12.27</td>
<td>51%</td>
<td>62,236</td>
</tr>
</tbody>
</table>

* CNF sample HH- 1140, Non - CNF sample HH -646
### SUMMARY RESULTS FOR RABI 2020-2021

<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop yields (Quintal/ha)</th>
<th>Gross-returns (Rs./ha) under</th>
<th>Paid-out costs (Rs./ha) under</th>
<th>Net-returns (Rs./ha) under</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CNF</td>
<td>Non-CNF</td>
<td>% change</td>
<td>CNF</td>
</tr>
<tr>
<td>Paddy</td>
<td>62.56</td>
<td>57.11</td>
<td>10%</td>
<td>104967</td>
</tr>
<tr>
<td>Groundnut</td>
<td>36.23</td>
<td>25.61</td>
<td>41%</td>
<td>2,08,215</td>
</tr>
<tr>
<td>Black Gram</td>
<td>12.97</td>
<td>13.05</td>
<td>-1%</td>
<td>84,836</td>
</tr>
<tr>
<td>Maize</td>
<td>75.86</td>
<td>63.01</td>
<td>20%</td>
<td>1,19,010</td>
</tr>
<tr>
<td>Green Gram</td>
<td>12.64</td>
<td>10.27</td>
<td>23%</td>
<td>77,919</td>
</tr>
</tbody>
</table>

*CNF sample HH- 800, Non CNF sample HH -494*
## IDS Study 2020-2021 Overall Results

### Net value of crop output in Rs per ha in 2020-2021 (for one crop)

<table>
<thead>
<tr>
<th></th>
<th>CNF</th>
<th>Non-CNF</th>
<th>Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Value (Rs./Ha.)</td>
<td>107013</td>
<td>92397</td>
<td>14616</td>
<td>15.82</td>
</tr>
<tr>
<td>Paidout Cost (Rs./Ha.)</td>
<td>49941</td>
<td>60775</td>
<td>-10834</td>
<td>-17.83</td>
</tr>
<tr>
<td>Net Value (Rs./Ha.)</td>
<td>57072</td>
<td>31622</td>
<td>25450</td>
<td>80.48</td>
</tr>
</tbody>
</table>

Ref: Table 6 to 8 of State Level data of IDS 2020-2021 Tables
Year wise area allocated to CNF, as a % of operational area Kharif 2020
Food and Nutrition diversity

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

Universal coverage strategy
Focus on landless, farmworkers

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

Y-axis = Water consumption in kilolitre

2 External evaluations being done:
1. WALAMTARI
2. ASCI – CORE CARBON X
In 2021, as in 2020, Andhra Pradesh has seen unseasonal rainfall across the state.

APCNF Farmers have experienced less damage compared to other farmers.
The positive impact of APCNF practices in controlling thrips damage in chilli crop

Survey findings
Percentage damage in chilli crop in APCNF versus Chemical crop: Due to Thrips infestation

- Number of farmers surveyed: 143 in Guntur and Prakasam
- APCNF farms: 70
- Chemical farms: 73

- The average proportion of damage in APCNF farms is just 10%, compared to conventional farms, where the average percentage of damage is substantial - 57%
NF - a possible solution to the global water problem and reversal of desertification

**Soil Aeration**

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

**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)

rivers of water in the air – in tropical countries, air contains 10 times the water in the rivers – upto 50,000 ppm
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
## Scaling up of Pre – Monsoon Dry Sowing breakthrough – harnessing water from the air

<table>
<thead>
<tr>
<th></th>
<th>PMDS 2018</th>
<th>Rabi Dry Sowing 2018</th>
<th>PMDS 2019</th>
<th>PMDS 2020</th>
<th>P.M.D.S 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of farmers</strong></td>
<td>11 (Pilot)</td>
<td>1383</td>
<td>21,635</td>
<td>103,340</td>
<td>348,000</td>
</tr>
<tr>
<td><strong>Area covered (in acres)</strong></td>
<td>11 acres</td>
<td>885</td>
<td>13,068</td>
<td>80,409</td>
<td>353,000</td>
</tr>
</tbody>
</table>
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.

Anantapuramu
- One of the Largest Districts in Andhra Pradesh
- Semi arid climate, with high temperatures for most of the year
- Average rainfall of 560mm (20 in) per year
- One of the most Drought prone districts in the country - droughts in 17 out of last 20 years
- Known for its red rocky soils, is almost like a desert
- 69% of cultivated area in Anantapur is under a single crop - groundnut
### 3 crops in an year in semi arid, dry lands

#### Ananthapuramu District Cropping Pattern based on Agro Ecological Zones

<table>
<thead>
<tr>
<th>Agro Ecology zones</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PMDS Window</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Kharif window</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rabi Window</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Redsoils</strong></td>
<td>Millets and pulses other 22 types crops</td>
<td>Groundnut &amp; other 21 types crops</td>
<td>Vegetables &amp; others 35 types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blacksoils</strong></td>
<td>Millets and pulses other 22 types crops</td>
<td>Cotton /Bengalgram &amp; 21 types crops</td>
<td>Vegetables &amp; others 35 types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
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

Rabi
Nov to Feb
Vegetables, greens, tubers and oilseed

PMDS
March to May
Mixed crops – vegetables, greens, millet, pulses, tubers and castor

Kharif
June to Oct
Relay of PMDS crops continued into Kharif season, with ground nut & millet as main crop
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
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

<table>
<thead>
<tr>
<th></th>
<th>Premonsoon Window</th>
<th>Kharif Window</th>
<th>Rabi Window</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apr*</td>
<td>May*</td>
<td>June*</td>
</tr>
<tr>
<td>Leafy vegetables</td>
<td>540</td>
<td>530</td>
<td>605</td>
</tr>
<tr>
<td>Marie gold</td>
<td>1150</td>
<td>2280</td>
<td>7500</td>
</tr>
<tr>
<td>Bajra</td>
<td>12680</td>
<td>12680</td>
<td>12680</td>
</tr>
<tr>
<td>Field Bean</td>
<td>15600</td>
<td>8320</td>
<td>5880</td>
</tr>
<tr>
<td>Cowpea</td>
<td>1044</td>
<td>1425</td>
<td>1875</td>
</tr>
<tr>
<td>Castor</td>
<td>200</td>
<td>320</td>
<td>600</td>
</tr>
<tr>
<td>Groundnut</td>
<td>33459</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red gram</td>
<td>23430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radish</td>
<td>1890</td>
<td>1560</td>
<td>1200</td>
</tr>
<tr>
<td>Tomato</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chilli</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brinjal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROSS INCOME</td>
<td>540</td>
<td>530</td>
<td>2999</td>
</tr>
<tr>
<td>EXPENDITURE</td>
<td>3515</td>
<td>1370</td>
<td>1220</td>
</tr>
<tr>
<td>NET INCOME</td>
<td>-2975</td>
<td>-840</td>
<td>1779</td>
</tr>
</tbody>
</table>

*Incomes incurred are from relay crop of the previous season*
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
- Research
- Innovations and continuous learning

**Knowledge**
- POPs, videos, etc

**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. Organic policy initiative of Govt of A.P

**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 2030.

- 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
Women in Natural Farming: Our biggest Strength

123,122 women SHGs and their 4740 Federations are in charge
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

8000 + 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
ICT in Natural Farming

- Communications (Local & Global) & Marketing
- Farmers, Land, Institutions, Monitoring & Learning
- Finance & Human Resources
- Extension & Capacity Building

Data Collection
Data Management
Data Analytics
Decision Making

Information & Communication Technologies (ICTs) in Natural Farming
Changing a farmer means changing entire village – long term handholding is critical

**Farmer Transformation**

450 farmers in a Village

**Year 5**: High end models

**Year 4**: full area

**Year 2**

**Year 1**

Each farmer takes 5 years to cover entire holding.

**Village Transformation**

- **Year 1**: 10 - 15% farmers
- **Year 2**: 35 - 50% farmers
- **Year 3**: > 80% farmers
- **Year 8**: 100%

In 5 to 8 years, a village becomes a ‘BIO-VILLAGE’
# NF Progression of farmers in a Farmer service centre (RBK)

<table>
<thead>
<tr>
<th>Year and Description</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF Enrolled</td>
<td>50</td>
<td>50</td>
<td>150</td>
<td>200</td>
<td>450</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>PMDS (Pre-Monsoon Dry Sowing)</td>
<td>0</td>
<td>100</td>
<td>250</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>Conversion to organic starts</td>
<td>0</td>
<td>50</td>
<td>100</td>
<td>250</td>
<td>450</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>Certified Organic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>250</td>
<td>450</td>
</tr>
</tbody>
</table>
## Individual farmer area transition

<table>
<thead>
<tr>
<th>Year and Description</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF (cumulative)</td>
<td>0.5</td>
<td>1</td>
<td>1.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMDS Cumulative Area</td>
<td>0</td>
<td>1</td>
<td>1.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Conversion year</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1.5</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Certified Organic Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>
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
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)
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 it impacts on growth and yield of different crops – PMDS + ZBNF, only ZBNF and Chemical Paddy
Summary of findings from few important studies

- 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% low in APCNF farms when compared to chemical farms (Published data)
- University of Reading: There is no yield penalty in APCNF and APCNF outperforms organic and conventional farms (Published data)
- Water study: APCNF uses 50 to 60 % less water and less electricity when compared to conventional farms
- CESS / IDS Study: The yields are 20 to 30% high in APCNF when compared to conventional farms
- Bird population: The bird visit are significantly high in APCNF farms when compared to chemical farms, Sparrows are returning back to farms (published data)
Bringing into cultivation Vast areas of arable lands are fallow (2017 – 18)

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

The APCNF Promise

- 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
## Transformation Cost

<table>
<thead>
<tr>
<th>#</th>
<th>Categories</th>
<th>COSTS (Rs.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ZBNF Capacity building</td>
<td>11,600</td>
<td>77%</td>
</tr>
<tr>
<td>2</td>
<td>Support to Community Institutions</td>
<td>1,315</td>
<td>9%</td>
</tr>
<tr>
<td>3</td>
<td>PGS Certification, Quality Assurance, Tracking and Monitoring</td>
<td>1,785</td>
<td>12%</td>
</tr>
<tr>
<td>4</td>
<td>Technical Support and Overall Programme Management at the District and State levels</td>
<td>300</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>15,000</td>
<td></td>
</tr>
</tbody>
</table>

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

Funds required to bring 6 million farmers under Natural Farming, over 10 years – Rs. 10000 Cr

Reach all farmers by 2027; farmland in the state by 2031
## Benefits to Govt finances from Natural farming - subsidy reduction and avoidance

<table>
<thead>
<tr>
<th>Year</th>
<th>Land Lakh Ha.</th>
<th>Electricity savings, Rs. Cr (25% savings)</th>
<th>Fertilizer subsidy Savings, Rs. Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-22</td>
<td>2.64</td>
<td>94</td>
<td>188</td>
</tr>
<tr>
<td>22-23</td>
<td>7.92</td>
<td>302</td>
<td>604</td>
</tr>
<tr>
<td>23-24</td>
<td>15.18</td>
<td>619</td>
<td>1,239</td>
</tr>
<tr>
<td>24-25</td>
<td>23.43</td>
<td>1,023</td>
<td>2,045</td>
</tr>
<tr>
<td>25-26</td>
<td>30.36</td>
<td>1,418</td>
<td>2,836</td>
</tr>
<tr>
<td>26-27</td>
<td>38.94</td>
<td>1,946</td>
<td>3,892</td>
</tr>
<tr>
<td>27-28</td>
<td>44.88</td>
<td>2,400</td>
<td>4,800</td>
</tr>
<tr>
<td>28-29</td>
<td>50.82</td>
<td>2,908</td>
<td>5,815</td>
</tr>
<tr>
<td>29-30</td>
<td>55.11</td>
<td>3,374</td>
<td>6,748</td>
</tr>
<tr>
<td>30-31</td>
<td>60.06</td>
<td>3,934</td>
<td>7,869</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60.06</strong></td>
<td><strong>18,018</strong></td>
<td><strong>36,035</strong></td>
</tr>
</tbody>
</table>
Natural farming and 365 days green cover can cool the planet

Global warming: Re-radiated heat – an imp cause

Soil / Water conservation
Food and nutrition security
Income generation
Reversal of desertification
NF + 365 DGC
National and International Collaborations

**With Countries**
- Government of Rwanda
- Government of Kenya
- Govt of Mexico
- CONABIO – Mexico
- The Alliance for food Sovereignty in Africa - AFSA

**With States, CSOs**
- National Resource organization to NITI Aayog on Natural Farming
- Co-founder National Coalition for Natural Farming
- Support to state governments and national civil society institutions

- NGOs in Rajasthan and Bundelkhand and Tribal Welfare department in Telangana
“..We do not inherit the earth from our ancestors, we borrow it from our children..”

LET US ALL ACT NOW