

# **Promoting Circularity in Food Production Systems**



**Indoomatee Ramma**

**Principal Research Scientist**

**Food and Agricultural Research and Extension Institute**

**National Conference on Circular Economy**

**25 - 27 May 2022**

# Content

- Global food system and its impacts
- Why the need to shift to Circular Food system
- Current policies/ strategies for promoting circularity/sustainability in the Agricultural production system
- Schemes to support adoption of circular agricultural practices
- Barriers preventing adoption of Circular food production system
- Way forward for transitioning to Circular Food System

# Global Food System's Impact on Natural Resources

Globally agriculture occupies 50% of earth habitable land



**CLIMATE  
CHANGE**

**DEFORESTATION**

**LAND  
DEGRADATION**

**ECOSYSTEMS  
SERVICES  
LOSS**

**BIODIVERSITY  
LOSS**

**FRESH WATER  
USE**

**POLLUTION**

**30%  
loss**

**80%  
loss**

**90%  
loss**

**80%  
loss**

**80%  
loss**

**70%  
loss**

**N 85%  
P 90%**



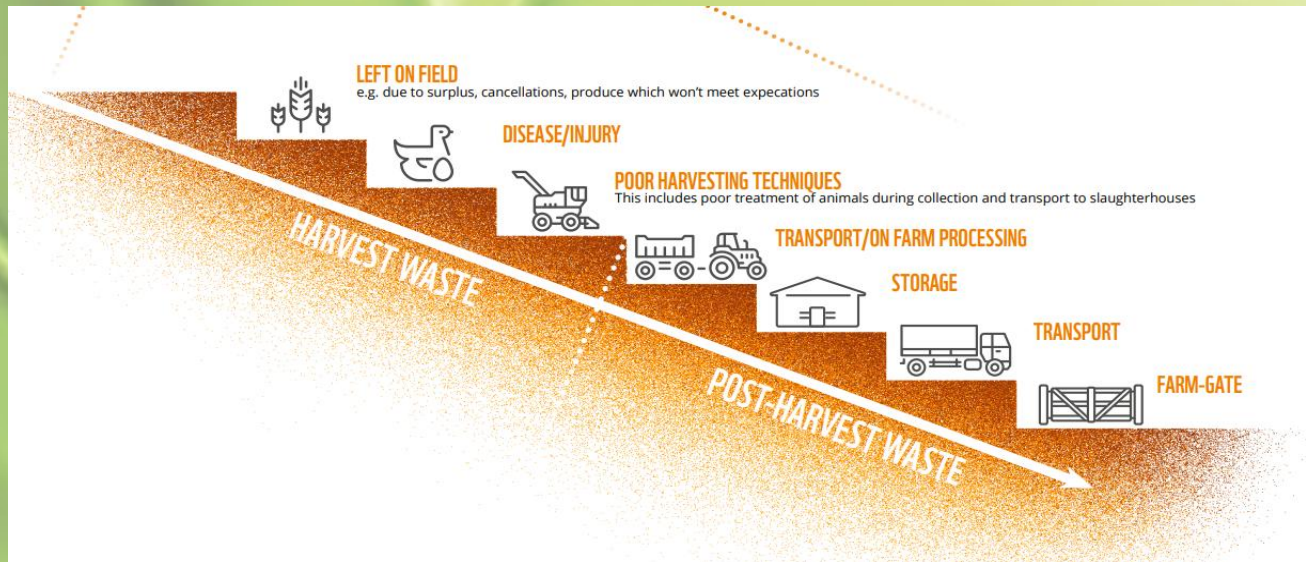
# Contribution of FOOD LOSS AND WASTE to climate change

30% of the food produced globally is either lost or wasted along the food supply chain- contributing to environmental degradation and food insecurity

- **Waste of resources: water, land, energy, labour and capital used in the production of the food**
- **Disposal in landfill leads to Greenhouse gas emissions and contribute climate change**



Diagram produced by Julia Pon of Wholesome Wave for the CT Farms, Food and Jobs Working Group, January 2012





# Is the way we are producing our food Sustainable?

**Conventional linear model : "Take-Produce-Consume-Discard"**



**NATURAL RESOURCES**



**TAKE**



**PRODUCE**



**CONSUME**



**Waste**

**DISCARD**

**Challenges**

Depletion of our limited natural resources (land, water)

Unstable supply & **Increasing** prices of inputs (chemical fertilisers, pesticides, seeds, feed)

Waste generation

**Environmental degradation:** pollution/ decline in soil health/fertility/ biodiversity loss

Climate change

# Re-think of an alternative approach to produce food

## Transition from Linear to Circular Economy Approach



**Circular agriculture (CA)** aims at closing the loop of materials and substances and reducing both resource use and discharges into the environment (Berkum, 2019)

# CIRCULAR AGRICULTURE

Focuses on ecological principles with modern technology

- ✓ Preserving and enhancing Natural Resources
- ✓ Use of Minimal External Inputs (e.g. fertilisers, pesticides, seed, feed)
- ✓ Efficient use of resources: closing nutrients loops (recycling of waste/water)
- ✓ Reducing environmental impact of discharge and runoff



# CIRCULAR AGRICULTURE

## CA practices include:

- Waste recycling, Use of manure/ compost /Value addition
- Anaerobic digestion of waste to biogas
- Agroforestry
- Conversion of biomass to biofuel/energy
- Nutrient and Water Management
- Soil conservation and fertility management
- Agroecological /Organic practices (rotation, polyculture, Mixed cropping /crop-livestock farming ...)

## BENEFITS

- ✓ Reduce resource requirements and the ecological footprint
- ✓ Reduce environmental impacts and combat climate change
- ✓ Improve sustainability and resilience
- ✓ Save money and create value
- ✓ Job creation & Support local economy



# **Policies & Strategies to encourage Circular Agriculture Production Practices**

**Foodcrop**

**Livestock**

**Agroprocessing**

# Strategic Plan for the Foodcrop, Livestock and Forestry sector

## Policy

Enhance local food production, improve food safety, promote sustainable agriculture, minimise postharvest losses and food waste and empower youth/women to undertake agribusiness activities

## Strategies

➤ Improve small farmers' access to land:

3089 arpents of state land leased to 1,208 smallholder farmers ( $\leq 2$  arp) and 118 cooperative societies ( $\leq 5$  arp) for a period of 7 years & renewable

Acentage of leased state land	Arpent
Foodcrops	2274
Livestock	425
Mixed Farming	155
Other (Agribusiness, hydroponics, nursery)	234

# Strategies

## ➤ Invest in R & D /New Technologies

- Increase productivity while minimising environmental impacts
- Improve post-harvest shelf life and minimise food lost and waste
- Adapt and improve resilience to climate change

Var. Summer Star  
Yield 45-50 t/ha  
**Heat tolerant**



Var. Francia  
**High yielding with  
good storability**



## Examples

- Improved crop varieties(better keeping quality/ disease tolerant, richer in nutrients)
- Integrated Crop Nutrient Management
- Integrated Pest and Disease Management- to minimise chemical fertiliser / runoff
- Crop Habitat Management to minimise use of pesticides
- Water saving and energy efficient irrigation technology



# Gravity-Fed Drip Fertigation System



## Save

- **40-50 % water**
- **15-20% fertiliser**
  
- **40-50 % higher yield**

## Solar Power-Driven Drip Fertigation

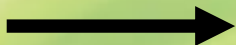




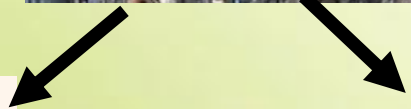
# New Technology: Conversion of organic waste into animal feed & compost



**Black Soldier Fly adult  
(BSF)**



BSF feed and decompose organic waste



(5 weeks)



Compost (BSF Frass –organic Fertilizer)



BSF larvae



Maggots meal



Used as fertiliser in crop production



Used as poultry feed

# Strategies

## ➤ Encourage adoption of Good Agricultural Practices (MauriGAP standard)/ Organic /agroecological, Natural farming practices/ Agroforestry

- Standard for Good Agricultural Practices for Crop Production
  - MauriGAP Basic level 1 (**MS 184:2015**)
- Standard for Compost / Standard for manure sanitising process
- Support certification

## ➤ Encourage Agri-waste recycling to Compost and Biogas /energy

- Demonstration of livestock waste conversion to biogas / portable biogas unit
- Setting up of a facility for pelletisation of manure

## ➤ Promote value addition and agro-processing through capacity building and provision of incubation facility





## Subsidy schemes to support adoption of CA practices in crop/livestock sector

Schemes	Purpose	No. of Beneficiaries
<b>Scheme for Upgrading of Livestock Farm</b>	use of renewable energy, rainwater harvesting and waste management	31
<b>Rain Water Harvesting Scheme- 50 % grant</b>	Conserve water	37
<b>Sheltered Farming Scheme</b>	Mitigate climatic impacts, reduce pesticides use	273
<b>Scheme for Purchase of agroprocessing equipment</b>	value addition to local agricultural produce	327
<b>Compost Subsidy Scheme</b>	Reduce dependence on chemical fertiliser & improve soil health/fertility	6839
<b>Biofarming support scheme</b>	Purchase of biofertiliser and biopesticides	256
<b>Bee-keeping Scheme</b>	increase honey production and improve ecosystem services	15
<b>Solar Powered cold Room</b>	Save energy and reduce postharvest losses	NEW

# Outreach

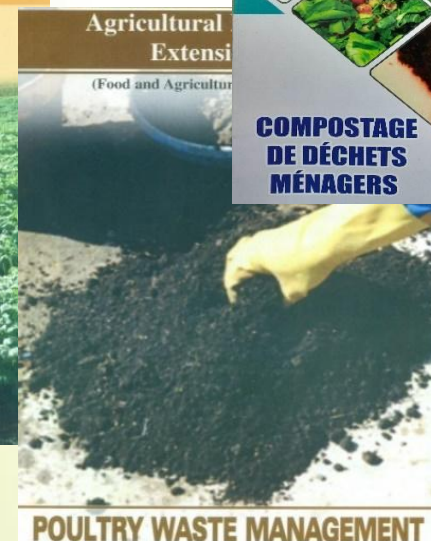
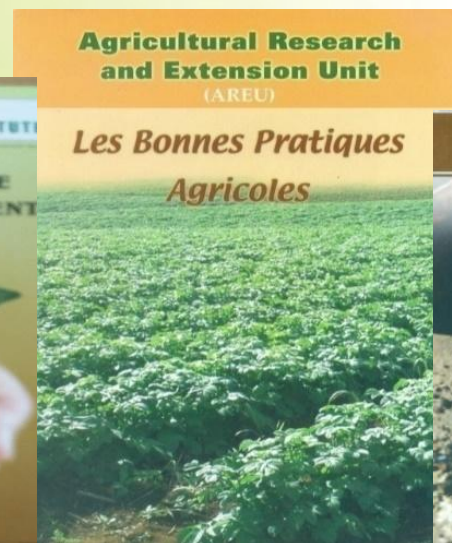
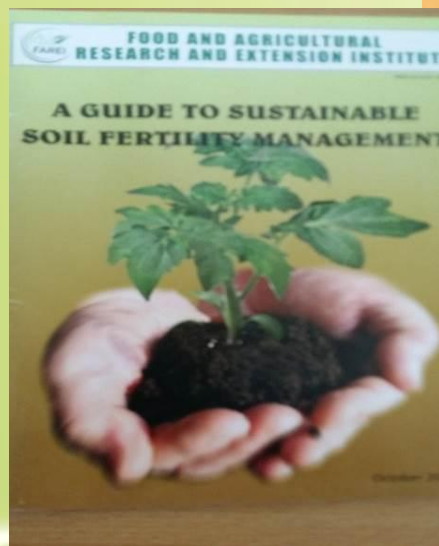
## Education and Training

- Soil conservation & fertility management
- Good agricultural practices
- Organic farming
- Waste management /Composting
- Postharvest handling
- Agro-processing (3000 beneficiaries)
- IPM technologies



## Publications

- 'A Guide to Sustainable Soil Fertility Management'
- 'Compostage de Déchets Ménagers'
- Good Agricultural Practices
- Poultry Waste management
- Biofertilisers
- Natural farming techniques



# Barriers to adoption of Circularity in food production System

- **Technological** – Access to appropriate technologies (e.g. for waste recovery/ food loss reduction) + high cost of technologies + Limited expertise
- **Policy**– Appropriate policy and regulations in agricultural circular economy has not yet been established (e.g. for food donation /sharing, food recovery and recycling)
- **Institutional** - Land tenure not in favour of adoption of conservation practices
  - Water rights to small holder farmers
  - Weak coordination among sectors to sufficiently integrate policy measures
- **Financial** – Access to finance for initial investment in CA systems using advanced technologies/ Certification
- **Social** – Stakeholders attitude towards environmental protection
- Limited information on benefits of CA practices
  - Small & scattered holdings                      Poor Social acceptance (taboos)
  - Labour Shortage
  - Ageing/ Risk averse



# Way Forward to transitioning to Circular Food System

- Awareness raising on CA practices to reduce impact on the environment
- Identify simple CA practices / technologies for high uptake
- Encourage adoption of CA practices through awareness raising/training / on-farm demonstration and peer-learning
- Formulate and implement supporting policies and regulations to increase uptake of innovative proven CA practices
- Establish standards and support certification processes( e.g. environmental and animal welfare standard)
  - Clustering of farmers to benefit from economies of scale
  - Promote integrated harmonised cross sectoral policies to promote CA systems



**Thank you for your attention**