



Food and Agriculture Organization
of the United Nations



**Global South-South Development Expo 2022 Thematic Solution
Forum 6: on Scaling up Conservation Agriculture to Accelerate
Agrifood Systems Transformation in the Global South**

Sustainable Agricultural Mechanization for Conservation Agriculture amongst Global South

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Pacific (ESCAP)**



About ESCAP-CSAM



- **Regional institution** of United Nations ESCAP hosted in China since 2003
- **Vision:** To achieve production gains, improved rural livelihood and poverty alleviation through **sustainable agricultural mechanization** for a more resilient, inclusive and sustainable Asia and the Pacific
- Dedicated to promoting **international cooperation and partnership** in sustainable agricultural mechanization.
 - Asia-Pacific regional hub for **South-to-South and Triangular Cooperation** servicing **62 ESCAP member States and associate members.**
- Focusing on **Sustainable Development Goals (SDG) 2** (Zero Hunger), **SDG 1** (no poverty), **SDG 13** (Climate Action), **SDG 17** (Partnerships for the Goals)

Need for Agricultural Machinery in Conservation Agriculture



Maintenance of a permanent soil cover

- Straw chopping and retention
- Crop stubble and straw management



No or minimum tillage

- Subsoiling management
- No or minimum tillage seeding
- Sowing quality improvement

Some Applications of Machinery in Conservation Agriculture

Application	Purpose	Examples of machinery	
Crop straw residue management, weed management	Straw mulch quality directly determines outcome of CA	Machines for chopping, returning stubble into soil	
Subsoiling (without inverting soil)	Loosen seed bed soil, break hard pan layer	Subsoilers	
No-till seeding	Seeding in crop residue conditions	No till seeders/ planters	

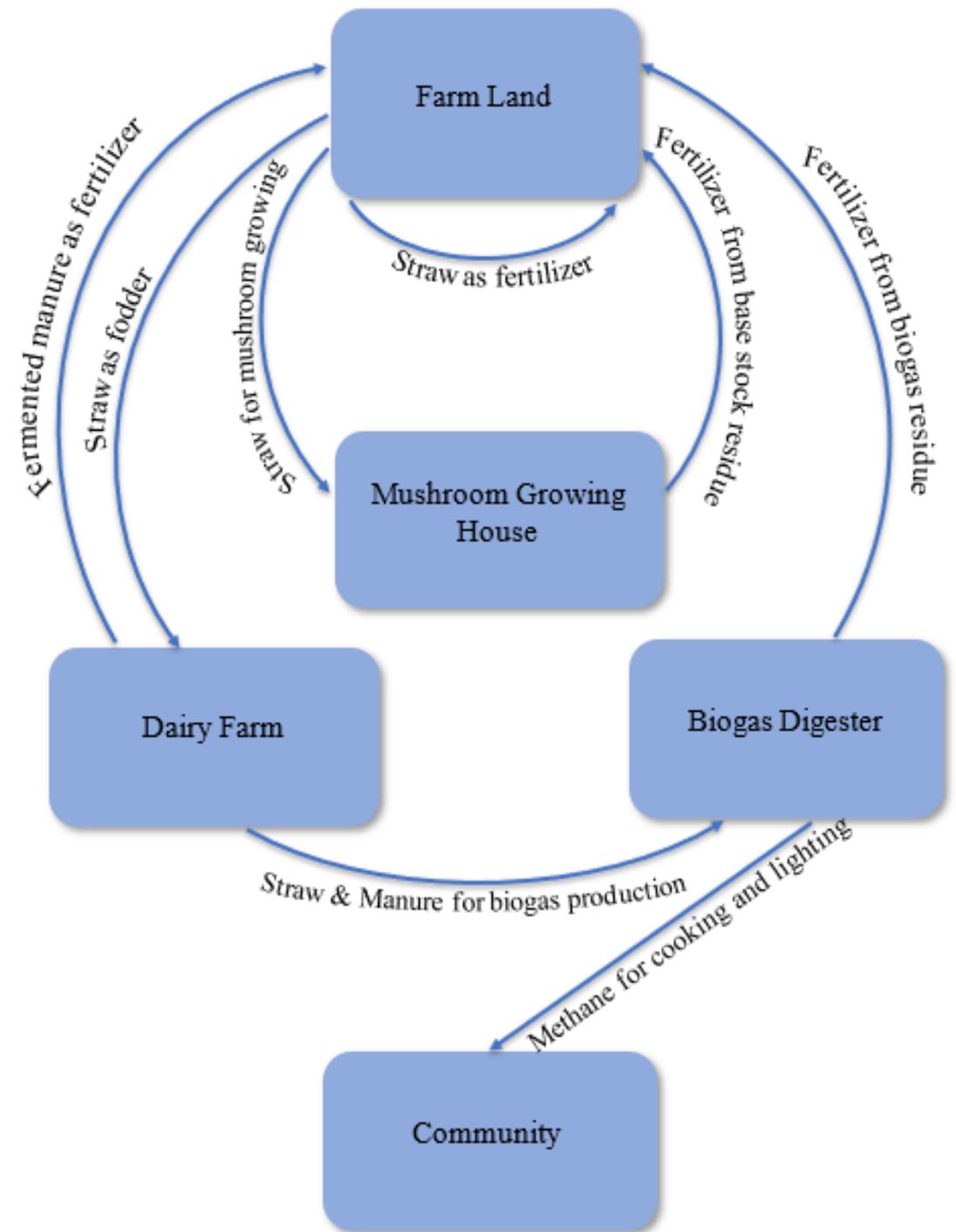
Benefits of Mechanization



- Promotes smooth implementation of CA, reduces labor costs, improves operational efficiency
- Improves soil quality and increases grain yield
- Helps give full play to advantages of conservation tillage (eg. reduced erosion, reduced GHG emissions from residue burning)
- Assists in popularization of CA (incl. for smallholder farmers through service provision, innovation)

Case Description: CSAM Regional Initiative on Integrated Management of Straw Residue via SSTC: Circular Model of Straw Utilization

- Promoting application of agricultural machinery and practices for sustainable, circular use of straw residue **as fertilizer, fodder, substrate for mushroom-growing, and biogas production**
- Priorities for country pilots (so far mostly on wheat-maize system—being extended to rice):
 - Sensitize stakeholders and **highlight economic benefits** of sustainable & integrated straw residue management to farmers
 - **Incentivize adoption** of sustainable mechanization solutions and encourage **adaptation** to match local needs



Pilot Project in Laixi, China (with China Agricultural University)

- Positive Outcomes (July 2019 to Aug 2021):
 - 172 tons of wheat and maize straw per year **sustainably utilized** from 7 ha pilot demonstration site amounting to an **equivalent reduction of 221 tons in CO₂ emissions** per year.
 - **Soil Organic Matter** under three approaches (returning straw to the field, returning cow manure to the field and returning biogas slurry & residue to the field) **increased to 2.21%, 2.23% and 2.24% respectively over a 1-year period**, from initial value of 2.1
 - New formula of cattle fodder from ensilage process **improved milk production by 1 ltr/day/cow**, increasing value of milk produced by 69 USD/day for 100 cows
 - **Net income** from sustainably returning straw to the field and returning cow manure to the field increased **by 456 USD/ha and 525 USD/ha** respectively

Pilot Project on Integrated Straw Management in Viet Nam

- Positive Outcomes (January 2018 to March 2019):
 - Promoted ‘**In-door mushroom growing technology**’ applying a steam sterilizer and water supplying system
 - Indoor mushroom growing technology demonstrated as **superior to traditional/ outdoor method**:
 - **Higher mushroom yield** - rice straw using efficiency of approximately 26% compared to 13-15% in traditional method
 - **Lower production cost**
 - **Higher mushroom quality**
 - Substrate after mushroom growing used as a natural fertilizer - considerably **reduced application of chemical fertilizers** and lowered production cost
 - **Improved porosity and fertility of soil** and reduced negative impact on environment induced by straw burning

Regional Knowledge Sharing: Study Tours in India and China



Integrated Straw
Management Regional
Study Tour, 7-10 November
2019, Ludhiana, India



Virtual Workshop and
Demonstration, 28 October
2020, Laixi, China

Expanding the Initiative through SSTC - New Pilot Projects in Cambodia, Indonesia & Nepal

- Ongoing and planned activities (2021-2022):
 - Establishment of pilot sites
 - Field trials
 - Modification of machinery
 - Capacity building and community awareness sessions
 - Regional study tour to leverage SSC
- Technical Modes: In-situ and ex-situ utilization of straw (as fodder and fertilizer) based on country needs

Key Takeaway: Agricultural machinery is critical to CA but local adaptation, community engagement, capacity building and regional cooperation are critical

ESCAP-CSAM's Regional Initiative Recognized as SSC Good Practice

'Regional Pilot Project on Mechanization Solutions for Integrated Management of Straw Residue in Asia and the Pacific' cited among 80 good practices in *"Good Practices in South-South and Triangular Cooperation in LDCs: From the Istanbul Programme of Action to Achieving Sustainable and Resilient Development"* (published by UNOSSC and other partners in March 2022)



Thank you!

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