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**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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# 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<br>(without inverting soil)         | Loosen seed bed soil, break hard pan layer            | Subsoilers   |   |
| No-till seeding                                | Seeding in crop residue conditions                    | No till seeders/<br>planters                       |  |

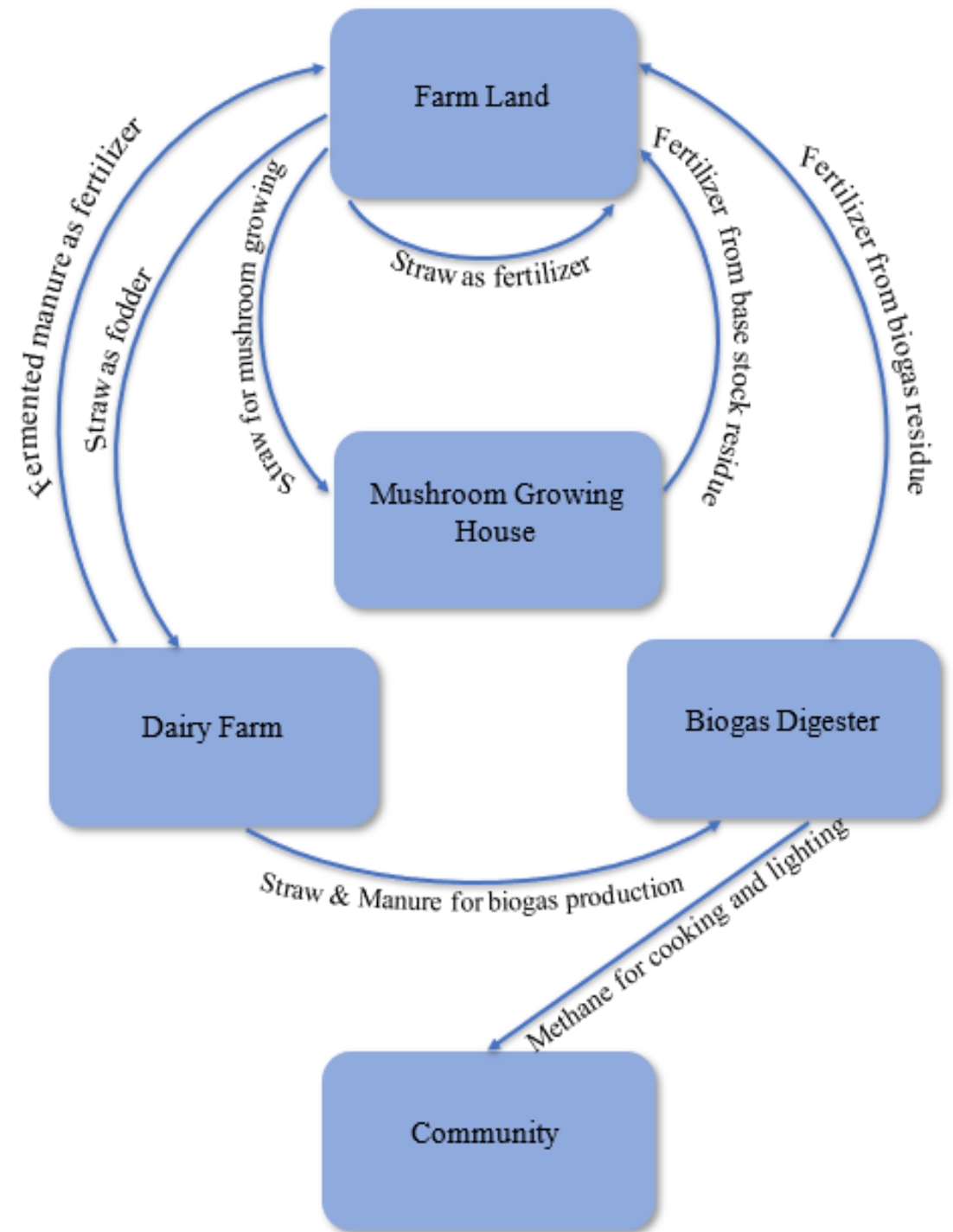
# Benefits of Mechanization



- 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 CO<sub>2</sub> 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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