2ND ANNUAL REGIONAL WORKSHOP ON

Conservation Agriculture and Sustainable Intensification

28-29 September 2021
Virtual Webinar | 14:00-17:00 GMT+7
Workshop Concept

➢ 2nd workshop after the Regional Training on Appropriate Scale Mechanization for Conservation Agriculture held in 2019 in Siem Reap
➢ Focus on development of and transition towards Conservation Agriculture and Sustainable Agriculture (CA/SI) and Agroecology (AE) in the region.
➢ Designed on the recommendation from the 2019 training to incorporate examples of success/failures
➢ 3rd workshop on 2022 (if possible a physical one)
Workshop Objective

- Provide updates on country policies that promote agroecology
- Provide lessons learnt on broad scale adoption of CA/SI
- Present success, scale, and commercialization stories
- Identify new challenges and opportunities
- Discussion on any regional efforts needed
Workshop Linkage

The outcomes of this workshop will also feed into another workshop on “AGROECOLOGY AND SAFE FOOD SYSTEM TRANSITIONS FOR GREEN, RESILIENT AND INCLUSIVE RECOVERY IN THE ASEAN REGION” in the ASEAN region that will be organized by Agroecological and Safe food System Transitions (ASSET) project along with UNESCAP and the ASEAN secretariat in 8th and 9th November 2021.
Currently we have a total of **141 participants** register for the workshop from over **38 different countries**.

We are expecting around 170 participants because some national participant did not register.

Register participants are from different organization including **Government**, **Researcher**, **Private Sector**, **NGO and INGO**, **University Professor** and **Student**.
Workshop Agenda

Day 1
- Opening Session
- **Session 1**: CA/SI Status in Asia
- **Session 2**: Addressing Technical Challenges Related to CA/SI Broad-Scale Adoption

Day 2
- **Session 3**: Managing Diversity in CA/SI Systems
- **Session 4**: Driving CA/SI Dissemination Process
- **Session 5**: Support by Development Partners on Enabling CA Environment
- Consultative Discussion on the Workshop
- Closing Session
For Participants:

- You will be muted throughout the end of the webinar. Apologies for this.

- The chat box will be disabled throughout the whole webinar.

- In each sessions, you can type in your questions in the Q&A box. The facilitators will address them at the end of each sessions.
Welcome Remark

Mr. Ho Puthea
Deputy Director of the General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries, Cambodia
And Vice Chair of CASIC Executive Board
Keynote Remark

Dr. Li Yutong

Head, Centre for Sustainable Agricultural Mechanization,
The United Nations Economic and Social Commission for Asia and the Pacific
Opening Remark

HE. Dr. Chan Saruth
Undersecretary of State of Ministry of Agriculture, Forestry and Fisheries, Cambodia
And Chair of CASIC Executive Board
Session 1: CA/SI status in Asia

Facilitator

Mr. Anshuman Varma, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM) UNESCAP

Speakers

Dr. SENG Vang (Ph.D.) Director of Department of Agricultural Land Resources Management (DALRM), Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia

Dr. Li Hongwen (Ph.D) Professor, Changjiang Scholar, China Agricultural University; Director of Conservation Tillage Research Center (CTRC), Ministry of Agriculture and Rural Affairs (MOA), P.R.C

Dr. ML Jat Principal Scientist/Systems Agronomist and Sustainable Intensification Strategy Leader for Asia & North Africa
Session 1: CA/SI status in Asia

2:30 PM – 2:40PM (10 mins)

Topic: Current Status of CA/SI in Cambodia

Dr. SENG Vang (Ph.D.) Director of Department of Agricultural Land Resources Management (DALRM). Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia
Current Status of CA/ SI in Cambodia
Dr. Seng Vang,
Director
Department of Agricultural Land Resources Management General Directorate of Agriculture/MAFF
OVERVIEW

1. Session
2. Contents
3. Key Takeaways
1 Session
Objectives of the session

- The main objective of this session is to show Cambodia’s progress in CA/SI implementation and showcase some of the success stories.
About Cambodia

Cambodia commits to achieve an economic growth rate of 7% per annum to reach an upper-middle income country by 2030. Agriculture is a key driver for economic development. Achieving a sustainable agricultural growth at 5% per annum aims to achieve the Royal Government of Cambodia’s objectives for food security, poverty reduction, and increased climate resiliency.

GDP: $27.09 billion (2019)
GDP Agriculture Sector: 26%
Country Land Area: 181,035 km²

National Forest Cover: 8,510,807 ha (46.86%)
(Included rubber and oil palm)

Agricultural land: 7,524,643 ha
(MOE, 2020)

Paddy field: 4.286 mill. ha
Non-rice: 3.238 mill. ha
Agricultural land use

- Low productivity of the lowlands and uplands: Low level of crop diversification, absence of growing legume crops, and poor crop management – Soil degradation in the long run.
- Improved practices: No-till systems, legumes-based crop diversification, BMP can help maintain soil fertility, increasing soil organic C, soil health - Essential for an agroecological transition.

Cultivated land

(2019):

Rice: 3.33 mill. ha
Non-rice: 1.46 mill. ha
Total: 4.79 mill. ha

Land degradation – land vulnerable to erosion

There is a need for the Cambodian agricultural sector to transform itself from increased production through land expansion with unsustainable use of land resources towards **sustainable intensification**.

Vulnerability to soil erosion:
- 0.49 million ha – highly
- 7.63 million ha – moderately
- 9.73 million ha – low to none

Small holder farmers are particularly **vulnerable to climate change** given their high **dependence** on rainfall and minimal crop diversification.

6.3 million Cambodians living on degrading agricultural land in 2010, practicing poor land management.
Land degradation – impact

- **Annual cost of land degradation** is estimated at USD 677 million or 3% of the country’s GDP (GM/UNCCD, 2018).
- Conventional tillage practice (Maize) increased soil loss by 13 times more than CA practice on 5% slope (DALRM, 2020).
- Soil erosion resulted in losses of SOC (870 kg/ha), N (90 kg/ha), P (0.42 kg/ha), K (10 kg/ha) (DALRM/GDA 2020, unpublished data).
THE CONSERVATION AGRICULTURE IN CAMBODIA

The 3 Principles:
• No-tillage
• Cover crop/Permanent cover
• Crop rotation

Soil Carbon accumulation
Soil restoration
Water infiltration & retention
Efficiency and Profit
CA - Initiatives towards the agroecological transition

- Small holder rubber development project (SRDP II)
- Projet d'Appui au Développement de l'Agriculture au Cambodge & PAMPA
- By R4D NW uplands CE SAIN/ SIIL (ASMC & WaGN)
- Cover crops & machinery CASF, (MIGIP)/SDC
- CASIC Dialogue politique
- Agroecology and Safe Food Systems Transition in SEA (ASSET), WAT4CAM, CE SAIN/SIIL (ASMC2, S3), ISA, MetKasekor

**Timeline:**
- **2004:** RESEARCH
- **2007:** AFD, FFEM (PAMPA)
- **2008 - 2013:** USAID, Agropolis, AFD, CCCA
- **2014 - 2019:** Sustainable and Natural Resources
- **2018:** ENGAGEMENT OF PRIVATE SECTOR
- **2021:** POLICY DIALOGUE AND EXTENSION
CA R4D and intervention areas

Kampong Cham:
- Bos Khnor CA Station
- Technology Park (CE SAIN)
- Upland, Red Oxisol
- Long-term experiments (since 2004)
- Genetic bank (> 50 species, > 300 varieties)

Kampong Thom:
- Irrigated scheme
- Organic rice
- Upland farming
- Demo & on-farm network (2020)

Preah Vihear:
- Irrigated scheme
- Sandy soils
- Long-term paired-plot design (2011)
- On-farm network (2015)

Battambang:
- Upland farming
- Mollisols
- On-farm network (2009)
- Experiment (2020)

Battambang:
- Flood plains (2009) and intensive irrigated rice (2020)
- Sandy to clayey soils
- National University of Battambang & CE SAIN Technology Park
- Experiment (2021) & On-farm network (2015)

Siem Reab:
- Vegetable production
- Sandy soils
- On-farm network (2009)
- CE SAIN Technology Park

CE SAIN Technology Park (CE SAIN)
- Upland, Red Oxisol
- Long-term experiments (since 2004)
- Genetic bank (> 50 species, > 300 varieties)
Developing adaptable management practices

Activities are incorporated in the development programs towards a safe and sustainable food system by designing agroecological cropping systems and assessing their impacts and performances.
CA education platforms

A strong Partnership of agronomists, research institutions, higher education, NGOs.

CE SAIN: Center of Excellence on Sustainable Agricultural Intensification and Nutrition (5 Technology parks in contrasted agro-ecosystems)

ALiSEA: Agroecology Learning Alliance in South East Asia which brought up stakeholders’ concerns

ASEA: Agroecology in South East Asia platform
CA adoption in Cambodia

Farmer’s land area applied CA practice from 2010 to 2021

Service with a fee (CASF)

**Supported by project**

- 2010: 31 ha
- 2011: 40 ha
- 2012: 132 ha
- 2013: 165 ha
- 2014: 265 ha
- 2015: 173 ha
- 2016: 149 ha
- 2017: 287 ha
- 2018: 536 ha
- 2019: 519 ha
- 2020: 1,393 ha
- 2021: 1,398 ha

- 709 farmers

**LAND PREPARATION: PRE-REQUISITE**
- Land levelling
- Breaking hardpan
- Cover crops for soil health improvement
- Planting cassava on no till
- Green sowing maize

**FULL CA PRACTICE TRANSITION**
In 2021: 709 farmers and 1398 ha of farmland under CA practice.

Why CA adoption is relatively low (land area)?

Are transition costs too high? Do farmers make profit?

It takes time and requires investment especially on CA implements.

Our innovative extension Model
MetKasekor is an “opening the market” early adopter led extension service model. MetKasekor focuses on opening the market for private sector investments on Sustainable Intensification via government agents and the private sector to smallholder farmers in Cambodia.
Unique features

**Public Sector**
Involved in “opening the market” for the private sector

**Private Sector**
Accompany the public sector during the sensitization of the farmers and provide the services on a commercial basis

**Early Adopters**
Agree to take the SI services and use their land to showcase the results to other farmers

**Government Extension**
Embed MetKasekor into the Government Extension System
**Metkasekor steps**

**Identification** of potential agriculture cooperatives, farmers and service providers

**Demand Creation** with agriculture cooperatives, service providers and smallholder farmers

**Field Showcase** by early adopter farmers of SI Operational Sequences

**Demand Creation Meeting**

**Field Showcase**

**Commercial Demonstration**

**Annual Meeting**

**Promotional Meeting with Private Sector**

**Large scale demonstration** led by private sector to showcase SI practices and technologies

**Annual Meeting** to review progress of the model (during pilot phase)

**Promotional Meeting** to enlarge the pool of private sector

In progress,.....
Exploring C market Concept

• Carbon certification process take a long time
• Farmers are not willing to wait for the carbon market and would not like to risk going to a new technique without incentive

Pilot in Cambodia 2021-2024, to incentivize farmers during the “WAIT”

2021

Carbon Certification process

2025

Carbon Credit

1. Enrolling in carbon registries
2. Mobilizing farmers to join
3. Collecting data about baseline carbon levels
4. Verifying emissions reductions, MRV-Measurements, Reporting and Verification
5. Selling carbon
CA implements support schemes

**Strategy:** Subsidy up to 50% of the CA’s implement package to ACs and/or service providers

**Goal:** Increase confidence of farmers on the accessibility to CA machinery services on time
### Cambodia - CA/SI Institutionalization

#### Institutional

- **CASIC** - Conservation Agriculture and Sustainable Intensification Consortium. A national platform for the members to create network between public sector, private sector and other organizations aiming to improve CA practices in Cambodia.
- **NAP Secretariat/MAFF** (NAP - National Action Program to Combat Land Degradation)
- **Bos Khnor** Conservation Agriculture Service Center/DALRM/GDA – to be the Regional Center of Excellence on CA/SI
- **CE SAIN/RUA** (Center of Excellence on Sustainable Agricultural Intensification and Nutrition)

#### Regulatory framework

- **NAP (2018-2027)** – UNCCD
- **RGC’s support** - A coalition for the transformation of food system through agroecology led by France (16 Sept. 2021)
- **FAO and IFAD joint support** to this coalition (21 Sept. 2021)
- **CIRAD and Swisscontact joint support** on CA/SI
- **CASIC’s 5-Year Road Map (2022-2026)** – finalized
- **Bos Khnor’s 5-Year Road Map (2022-2026)** – final draft
- **WAT4CAM** (Water Resources Management and Agroecological Transition for Cambodia) – Implementation phase 1
- **RAD4CAM** (Rainfed Agriculture Technology Development Program for Cambodia) – FS phase
3

Key Takeaways
Key take-aways

In Cambodia, CA/SI has successfully evolved into agroecology and safe food system transition.

- CA/SI – Historical development phases with well designed objectives (What has been achieved, what is next and how?).
- Strong commitment of the Government (MAFF), Development Partners (AFD, EU, SDC, USAID), NGOs (Swisscontact, CIRAD), and Private sector (SmartAgro) – a MUST.
- Innovative Extension Model, Metkaksekor – An additional approach to scale out CA/SI practices
- CA/SI institutionalization and supporting framework are vital to a successful transition.
Thank You
Session 1: CA/SI status in Asia

2:40 PM – 2:50 PM
(10 mins)

Topic: Current Status of CA/SI in China

Dr. Li Hongwen (Ph.D) Professor, Changjiang Scholar, China Agricultural University; Director of Conservation Tillage Research Center (CTRC), Ministry of Agriculture and Rural Affairs (MOA), P.R.C
New Development of Conservation Tillage in China

Dr. Li Hongwen
Director, China Institute for Conservation Tillage in China
Agricultural University
Head, Conservation Tillage Research Centre, MOA
Regional Training on Appropriate Scale Mechanization for Conservation Agriculture held in 2019 in Siem Reap and Bos Khnor, Cambodia,
REGIONAL TRAINING
ON APPROPRIATE SCALE MECHANISATION
FOR CONSERVATION AGRICULTURE

06-09 May 2019
Siem Reap & Bos Knor Research Station
CAMBODIA

Policies in Conservation Agriculture

Dr. Li Hongwen
Professor, China Agricultural University
Head, Conservation Tillage Research Centre, MOA
Email: lhwen@cau.edu.cn
Conservation tillage has been widely known in China.
Conservation Tillage got attention from highest level

Protect black soil like protect Panda. Stubble cover.

22/07/2020
2019年8月23日，长春
International Forum on Black soil Conservation, 2021

Let's join our efforts for promotion of Conservation Agriculture to achieve the Sustainable Development Goals.

让我们共同努力推广保护性农业，实现可持续发展目标

FAO Conservation Agriculture Website
http://www.fao.org/conservation-agriculture/zh/

For further information please contact:
Josef Kienzl josef.kienzl@fao.org

Acknowledgment 谢谢
• Hafiz Musinjanov (FAO, NSP)
• Shanghuang Liang (FAO, NSP)
• Rural and Urban Crop and Mechanization Systems Team
• Fleet Production and Protection Division (NSP)
• Food and Agriculture Organization of the United Nations
Focus on special area—black soil

Action of conservation tillage in Black Soil
Objective: extend conservation tillage to 9.3 Million ha from 2020-2025
China institute for Conservation Tillage in China Agricultural University

Beijing, July, 2019
Professional Committee of Conservation tillage, China Association of Agricultural Mechanization
In 2019, the project was carried out with the support of CSAM and a pilot was established in Laixi, Qingdao.
Conservation Agriculture Alliance for Asia-Pacific (CAAAP)
New Technology for cutting straw

Water jet cutting
Precision, high speed no till seeder for maize

Improve work efficiency and planting quality
Intellectual technologies

Automatic measure Straw cover rate
Use Satellite to guide no till seeders

To avoid maize root,
To improve no till seeding quality
Monitoring Main performance parameters

No till Seeder
Development of CA in China

Area (Mha)

18 years, 80 Times
Thank You

2ND ANNUAL REGIONAL WORKSHOP ON
Conservation Agriculture & Sustainable Intensification

CASCI
ESCAP
CSAM
ASEA
cirad
swisscontact
Session 1: CA/SI status in Asia

2:50 PM – 3:00 PM
(10 mins)

Topic: Current Status of CA/SI in India

Dr. ML Jat Principal Scientist/Systems Agronomist and Sustainable Intensification Strategy Leader for Asia & North Africa
Conservation Agriculture Based Sustainable Intensification: India Updates

ML Jat
Principal Scientist & Strategy Leader, Sustainable Intensification
(M.Jat@cgiar.org; www.cimmyt.org)

International Maize and Wheat Improvement Center
India’s Current Focus on CASI

**Land configuration management:**
✓ Laser assisted precision land leveling

**Tillage, Crop establishment & biomass management:**
Conservation Agriculture (CA) based management practices
✓ Zero tillage
✓ In-situ crop residue management with zero tillage
✓ Direct seeded rice
✓ Raised bed planting
✓ Inclusion of short duration legumes in intensive systems/diversification/intensification

**Precision water management in CA**
✓ Micro irrigation
✓ Automation

<table>
<thead>
<tr>
<th>Introduced in India during 2000-01 (RWC/CIMMYT-IRRI, ICAR/NARS)</th>
<th>Adoption: ~7 million ha in India</th>
<th>Direct employment generation: 350 person days/unit/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>At current level (45000 units) employment generation: 17 million person days/yr</td>
<td>Indirect employment: manufacturing, transport, services</td>
<td>Yield gains in RW system (5 mha, 0.5 t ha-1 yr-1) &gt;2 mt yr-1;</td>
</tr>
<tr>
<td>Electricity saving for irrigation</td>
<td>Water saving in RW system (5 mha, 18 ha-cm ha-1 yr-1) = 10 km3 yr-1</td>
<td>Other benefits- GHG mitigation, savings in subsidy bill etc</td>
</tr>
</tbody>
</table>

Source: Jat et al, 2006; 2009a,b; 2011; 2015; Aryal et al, 2015, 2018
Conservation agriculture for sustainable intensification in South Asia

Mangi Lal Jat, Debasish Chakraborty, Jagdish Kumar Ladha, Dharamvir Singh Rana, Mahesh Kumar Gathala, Andrew McDonald and Bruno Gerard
Meta-Analysis of performance of CA in South Asia

Profitable Residue Management Alternatives with CA

Fields on fire: Alternatives to crop residue burning in India
Farmer profit can be increased and air quality improved


Science, 9 AUGUST 2019, VOL 365 ISSUE 6452
COVID Impacts on Farmers in NW India (N=1602)

CIMMYT-ICAR Joint study (under publication)
COVID-19

Labor reverse migration

Delayed rice transplanting

Production loss

Balwinder-Singh, PB Shirath, ML Jat et al (2020)-Agriculture Systems
Direct Seeding of Rice (DSR): Opportunities under COVID (N=1602)

CIMMYT-ICAR Joint study (under publication)
Direct Seeded Rice is a new focus after COVID

6 lakh hectares under direct seeding of rice in Punjab, highest so far
### Farmers’ Response on Direct Seeding of Rice in NW India (N=1602)

#### Haryana
- **Overall ratings**
- **Ease of operation**
- **Quick crop establishment**
- **Cost-saving**

#### Punjab
- **Overall ratings**
- **Ease of operation**
- **Quick crop establishment**
- **Cost-saving**

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**CIMMYT-ICAR Joint study (under publication)**
Advances in CA Machinery Development/Refinement

- Since 1998, over 75 modifications/refinement in first zero-till drill developed way back in 1990’s
- New furrow openers
- New and low cost seed metering systems
- Innovative seeders- India is exporting to over 40 countries
New Addition to CA Planters - Smart Seeder
Building the capacity: Advanced Course on CA@CIMMYT India-ICAR-An example

**Advanced Course—Asia & North Africa**

**CONSERVATION AGRICULTURE:** Gateway for Sustainable Intensification of Smallholder Systems

- **10th Batch**
  - Commencing from 7th November 2019
  - Dates: November 7-22, 2019
  - Venue: CIMMYT-BISA, Ludhiana/Karnal India

**Second International Training Course on Conservation Agriculture and Scale Appropriate Mechanization for West Africa**

- **Second Batch**
  - Commencing 27th March, 2019
  - Dates: March 27, 2019 - April 10, 2019
  - Venue: BISA-CIMMYT, Ludhiana (Punjab), India
  - Duration: 15 Days
Advanced Course on CA/SI@CIMMYT-ICAR India

- **NRM:** Agronomy, Soil Science
- **Agril Engineering:** Farm Machinery & Power Engineering, Soil Water Engineering
- **Crop Sciences:** Plant Physiology, Plant Breeding
- **Social Sciences:** Agricultural Extension, Agricultural Economics, Agricultural Statistics, Agri-Business Management
Research Evidence are Filling in to Policy for Scaling

Building the resilient systems through CA/SI
Carbon Credits: Incentivizing Farmers for CA

- **Farm-level additional economic benefits of regenerative agricultural practices through Carbon trading**
  - ₹ per hectare per year

<table>
<thead>
<tr>
<th></th>
<th>Direct Seeded Rice-Zero till Wheat</th>
<th>Conventional Rice-Wheat System</th>
<th>Zero till Maize-Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZT Wheat</td>
<td>1,300</td>
<td></td>
<td>2,300</td>
</tr>
<tr>
<td>N manag...</td>
<td>1,650</td>
<td></td>
<td>1,650</td>
</tr>
<tr>
<td>Total...</td>
<td>2,300</td>
<td></td>
<td>4,000</td>
</tr>
<tr>
<td>₹ per hectare</td>
<td>750</td>
<td></td>
<td>750</td>
</tr>
</tbody>
</table>

- Saving of 40 cm per ha
- ₹ 2,200 per ha lower energy cost
- Saving of 140 cm per ha
- ₹ 15,500 per ha lower energy cost

- Regenerative agricultural practices are a set of **proven technologies to improve farm incomes**

- **GHG reduction** from these practices can be **monetised by linking to carbon markets**

*The calculations assume existing market rates of carbon credit, which translate to ₹ 700 to ₹ 1500 per Ton CO$_2$e; Monetary value calculations are based on ₹ 840 per Ton CO$_2$e; Source: doi.org/10.1038/s41598-020-76035-z*
Thank you for your interest!

Photo Credits (top left to bottom right): Julia Cumes/CIMMYT, Azais Yaqub/CIMMYT, CIMMYT archives, Marcelo Ortiz/CIMMYT, David Hansen/University of Minnesota, CIMMYT archives, CIMMYT archives (maize), Ranak Martin/CIMMYT, CIMMYT archives.
Q&A for Session 1

Facilitator

Mr. Anshuman Varma, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM)
UNESCAP

Speakers

Dr. SENG Vang (Ph.D.) Director of Department of Agricultural Land Resources Management (DALRM), Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia

Dr. Li Hongwen (Ph.D) Professor, Changjiang Scholar, China Agricultural University; Director of Conservation Tillage Research Center (CTRC), Ministry of Agriculture and Rural Affairs (MOA), P.R.C

Dr. ML Jat Principal Scientist/Systems Agronomist and Sustainable Intensification Strategy Leader for Asia & North Africa
Video Break

CASIC Introduction Video

This video will highlight:

- The currently issue Cambodian farmers are facing!
- Brief introduction of conservation agriculture
- Brief Introduction of CASIC