2ND ANNUAL REGIONAL WORKSHOP ON

Conservation Agriculture and Sustainable Intensification

28-29 September 2021
Virtual Webinar | 14:00-17:00 GMT+7
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
Introduction Video

CASIC Introduction Video

This video will highlight:

- The currently issue Cambodian farmers are facing!
- Brief introduction of conservation agriculture
- Brief Introduction of CASIC
Session 3: Managing Diversity in CA/SI Systems Adoption

**Facilitator**

Dr. Hin Lyhour, Researcher and Department Head of Agricultural Machinery, Faculty of Agricultural Engineering at the Royal University of Agriculture (RUA).

**Speakers**

- Mr. Anshuman Varma, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM)
- Dr. Jean-Philippe Deguine, Senior scientist, agroecologist and entomologist at CIRAD (UMR PVBMT)
- Dr. Clément RIGAL, Tropical agronomist at CIRAD
- Dr. Selvaraju Ramasamy, Head of Research and Extension Unit, Office of Innovation FAO
Mechanization Solutions for Integrated Management of Straw Residue in Asia-Pacific

Mr. Anshuman Varma, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM)
Mechanization Solutions for Integrated Management of Straw Residue in Asia-Pacific

Anshuman Varma
Programme Officer and Deputy Head
Centre for Sustainable Agricultural Mechanization (CSAM)
United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)
Session 1
Objectives of the Session

About ESCAP-CSAM

About CSAM’s Regional Initiative on Integrated Management of Straw Residue
Objectives of the Session

About ESCAP-CSAM

About CSAM’s Regional Initiative on Integrated Management of Straw Residue
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 17 (Partnerships for the Goals)
CSAM’s Key Functions to enable Sustainable Agricultural Mechanization

Regional Cooperation
Capacity Building
Research and Advisory
Communication and Outreach
Partnership Building

South-South and Triangular Cooperation underlies all of CSAM’s work
Content
Objectives of the Session

About ESCAP-CSAM

About CSAM’s Regional Initiative on Integrated Management of Straw Residue
Burning of Crop Residue and Mechanization Solutions

- Asia is the largest producer of crop residue annually producing 600-800 million tonnes of rice straw alone

- Crop residue burning is a serious concern in many countries of the region leading to:
  - Negative impact on soil nutrients, pH, moisture, organic matter, fertility
  - Air pollution, transboundary haze and GHG emissions
  - Public health hazard, transportation disruptions

- Residue burning is against the CA principles of minimum soil disturbance and permanent soil cover

- Agricultural machinery can provide sustainable solutions to address residue burning
Regional Initiative on Integrated Management of Straw Residue

- Launched in 2018 with Pilot Projects in China and Viet Nam
- Aim:
  - To develop an innovative, circular and green model of integrated straw management
  - To enhance awareness of farmers and other key stakeholders on technologies and models for integrated straw management
  - To upscale application of successful integrated straw management technologies and models
The Regional Initiative on Integrated Straw Management is 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:
- 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 on Integrated Straw Management in China

- **Location:** Laixi, Qingdao, Shandong Province
- **Partners:**
  - China Agricultural University (CAU)
  - Qingdao Administration of Agriculture and Rural Affairs
  - Laixi Administration of Agriculture and Rural Affairs
  - Qingdao Zhitao Agricultural Machinery Specialized Cooperative
- **Technical Modes:** Straw used as fertilizer, fodder, bio-gas production in a circular manner
Technical Mode: Straw used as Fertilizer

1) Returning straw to the field

a) Wheat harvesting and straw chopping

b) Maize no-till planting

c) Maize harvesting

g) Seedling emergence

f) Sprinkling irrigation

e) Wheat planting

d) Straw chopping and mixing with soil
Technical Mode: Straw used as Fertilizer

2) Returning cow manure to the field

a) Feeding cows

b) Cow manure composting in fertilizer processing factory (using cow manure rotator)

c) Sewage disposal through cow manure drain trap

d) Dry-wet cow manure separation

e) Returning cow manure to the field
Technical Mode: Straw used as Fodder (Ensilage Maize)

a) Maize harvested by maize ensilage harvester

b) Compacting straw

c) Straw fermentation

d) Processing fodder

e) Feeding cows
Technical Mode: Returning Biogas Slurry/Residue to the Field

a) Biogas production
b) Separation of biogas slurry/residue
d) Returning biogas slurry (with water) to the field (After winter wheat germination)
c) Returning biogas residue to the field (Before winter wheat planting)
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.
Snapshots of Pilot Project on Integrated Straw Management in China
Pilot Project on Integrated Straw Management in Vietnam

• Location: Can Tho City
• Partner: Sub-Institute of Agricultural Engineering & Post-harvest Technology (SIAEP)
• Technical Mode: Straw used as substrate for mushroom growing
Pilot Project on Integrated Straw Management in Viet Nam

• Positive Outcomes (January 2018 to March 2019):
  o Promoted ‘In-door mushroom growing technology’ applying a steam sterilizer and water supplying system
  o Indoor mushroom growing technology demonstrated as superior to traditional/ outdoor method:
    o Higher mushroom yield - rice straw using efficiency of approximately 26% compared to 13-15% in traditional method
    o Lower production cost
    o Higher mushroom quality
  o Substrate after mushroom growing used as a natural fertilizer - considerably reduced application of chemical fertilizers and lowered production cost
  o Improved porosity and fertility of soil and reduced negative impact on environment induced by straw burning
Snapshots of Pilot Project on Integrated Straw Management in Viet Nam
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 - New Pilot Projects in Cambodia, Indonesia & Nepal (under initiation)

• Partners:
  o **Cambodia:** Department of Agricultural Engineering/GDA, Ministry of Agriculture, Forestry and Fisheries & Swisscontact
  o **Indonesia:** Indonesian Centre for Agricultural Engineering Research and Development, Indonesian Agency for Agricultural Research and Development, Ministry of Agriculture
  o **Nepal:** Department of Agricultural Engineering, Purwanchal Campus, Institute of Engineering, Tribhuvan University; local enterprise; Department of Agriculture
Expanding the Initiative - New Pilot Projects in Cambodia, Indonesia & Nepal (under initiation)

- Planned activities (2021-2022):
  - Establishment of pilot sites
  - Field trials
  - Modification of machinery
  - Capacity building and community awareness sessions
  - Regional study tour

- Technical Modes: In-situ and ex-situ utilization of straw (as fodder and fertilizer) based on country needs
3

Key Takeaways
What are the Key Takeaways

- Asia is the largest producer of crop residue and straw burning is a shared and transboundary concern in the region.
- Burning of straw residue poses an important challenge to CA/SI and to nature positive production.
- **Agricultural machinery** can provide sustainable solutions to address residue burning but local adaptation, community engagement, capacity building and regional cooperation are critical.
- CSAM is making efforts via its Regional Initiative on Integrated Straw Management towards a sustainable, circular model of using straw residue.
- Demonstration of **positive results** from China and Viet Nam has helped secure additional donor funding for expansion to new countries.
Contact Us

Centre for Sustainable Agricultural Mechanization, United Nations Economic and Social Commission for Asia and the Pacific

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- Website: un-csam.org
- Email: varmaa@un.org
Thank You
Promoting vegetal biodiversity in Agroecological Crop Protection

Dr. Jean-Philippe Deguine, Researcher of CIRAD,
Can Tho University
Jean-Philippe Deguine,
**Promoting vegetal biodiversity in Agroecological Crop Protection**

- CIRAD, Mixed Research Unit PVBMT, Réunion Island, FR
- Can Tho University, Fac of Agriculture, Can Tho, VN
- WAT4CAM project, Cambodia
OVERVIEW

1. Session
2. Contents
3. Key Takeaways
Session 1
Objectives: Promoting vegetal biodiversity in ACP

- Is biodiversity a key component for natural pest control?

- How to manage biodiversity in the field?

- What conditions are necessary to increase biodiversity in farmer fields?
Contents of the topic Promoting vegetal biodiversity in ACP

• 1. Agroecological Crop Protection
• 2. Importance and modes of vegetal diversification in ACP
• 3. Focus on crop diversification
• 4. Challenges and requirements to promote vegetal diversification
• Conclusion
1. Agroecological Crop Protection

Why ACP?

• Crop Protection relays on pesticide use for a long time

• Most of the agroecosystems are not sustainable

• Contribution to global changes
1. Agroecological Crop Protection

What is ACP?

• Application of Agroecology in Crop
1. Agroecological Crop Protection

What is ACP?

• Application of Agroecology in Crop Protection

• 3 components

  1. Science
  2. Practices
  3. Social interactions

• Prevention

• Soil health

• Biodiversity
Promoting vegetal biodiversity in ACP

1. Agroecological Crop Protection

2. Importance and modes of vegetal diversification in ACP

3. Focus on crop diversification

4. Challenges and requirements to promote vegetal diversification

Conclusion
2. Importance and modes of vegetal diversification in ACP

Biodiversity

• **Cultivated** vegetal biodiversity

• **Associated** biodiversity
  • **Vegetal** un-cultivated biodiversity
  • **Animal** biodiversity
2. Importance and modes of vegetal diversification in ACP

- A structuration of vegetal diversification at different levels
2. Importance and modes of vegetal diversification in ACP

- A diversified arsenal of vegetal diversification practices

<table>
<thead>
<tr>
<th>Diversification of vegetation</th>
<th>Management of crop sequences, fallow periods, relay crops, temporary grasslands</th>
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<tbody>
<tr>
<td>In time</td>
<td>Intra-specific diversity: for each crop use of several cultivars on one farm, variety mixtures (lines, hybrids, populations, etc.), intra-specific rootstocks (perennial crops)</td>
</tr>
<tr>
<td>In space</td>
<td>Inter-specific diversity: intercropping, mixed crops, grasslands, service plants (beetle banks, flower strips, trap plants, refuge plants, etc.), crop and fallow alternation on farmland, plot shape and size, intra-family and inter-specific rootstocks, etc.</td>
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<thead>
<tr>
<th>Improvement of cultivated plants in the field</th>
<th>Management of rotations and crop sequences</th>
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<tbody>
<tr>
<td>In time and in space</td>
<td>Crop diversification</td>
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<table>
<thead>
<tr>
<th>Improvement of cultivated diversity at the farm and landscape level</th>
<th>Management of field margins and ecological corridors</th>
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<tr>
<td>In time</td>
<td>Hedgerows, uncultivated meadows, uncultivated forests, groves, isolated trees, embankments, ditches, ecological corridors, green and blue infrastructures</td>
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<tr>
<th>Improvement of seminatural habitats at the farm and landscape level</th>
<th>In space</th>
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[Image of diversification practices]
Contents of the topic **Promoting vegetal biodiversity in ACP**

- 1. Agroecological Crop Protection
- 2. Importance and modes of vegetal diversification in ACP
- 3. Focus on crop diversification
- 4. Challenges and requirements to promote vegetal diversification
- Conclusion
3. Focus on crop diversification

A recent and large-scale synthesis review


- 95 meta-analyses,
- 5,156 studies
- 54,554 experiments
- 85 years
- 120 crop species
- 85 countries

5 major CS diversification practices
- Agroforestry
- Intercropping
- Variety mixtures
- Crop rotation
- Cover crop systems
3. Focus on crop diversification

**Benefits of Crop Diversification**

- **Crop production**: + 14%
- **Pest and disease control**: + 63%
- **Water quality**: + 50%
- **Soil quality**: + 11%


Beillouin et al. 2021
3. Focus on crop diversification

BENEFITS OF CROP DIVERSIFICATION

Crop production + 14%

Pest and disease control + 63%

Water quality + 50%

Soil quality + 11%


Beillouin et al. 2021
3. Focus on crop diversification

Crop diversification type vs pest and disease regulation

- All
- Cover crops
- Intercropping
- Agroforestry

Beillouin et al. 2021
3. Focus on crop diversification

Crop diversification vs pest type regulation
3. Focus on crop diversification

<table>
<thead>
<tr>
<th></th>
<th>Agroforestry</th>
<th>Cover crops</th>
<th>Crop rotation</th>
<th>Intercropping</th>
<th>Variety mixtures</th>
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<tr>
<td>Production</td>
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<td>Associated biodiversity</td>
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<tr>
<td>Soil quality</td>
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<tr>
<td>Pest and disease control</td>
<td>+ 59 %</td>
<td>+ 125 %</td>
<td>?</td>
<td>+ 66 %</td>
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<td>Water quality</td>
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<td>Water use</td>
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<td>Greenhouse gas emission</td>
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<td>Input use efficiency</td>
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<td>Cost-effectiveness</td>
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Beillouin et al. 2021
3. Focus on crop diversification

Contribution of intercropping to pesticide use reduction

% mixture cases that resulted in reductions, increases or no change in infestation of weeds, diseases, and insects.

Policy brief, April 2021

Stomph et al. 2020
3. Focus on crop diversification

+ 24% in associated vegetal biodiversity

Photo: Eric Penot, Cirad

Beillouin et al. 2021
3. Focus on crop diversification

Increase in associated animal biodiversity
3. Focus on crop diversification

Increase in associated animal biodiversity
Contents of the topic  Promoting vegetal biodiversity in ACP

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• Conclusion
4. Challenges and requirements to promote vegetal diversification
4. Challenges and requirements to promote vegetal diversification

A need of support
4. Challenges and requirements to promote vegetal diversification

A need of research
Conclusion: objectives ❯ answers and requirements

• Is biodiversity a key component for natural pest control?

• How to manage biodiversity in the field?

• What conditions are necessary to increase biodiversity in farmer fields?
Yes, biodiversity is a key component for natural pest control

How to manage biodiversity in the field?

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How to manage biodiversity in the field?

What conditions are necessary to increase biodiversity in farmer fields?
Yes, biodiversity is a key component for natural pest control

There is a call for adaptation and management of biodiversity in the field

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Yes, biodiversity is a key component for natural pest control

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What conditions are necessary to increase biodiversity in farmer fields?
Yes, biodiversity is a key component for natural pest control

There is a call for adaptation and management of biodiversity in the field

New modes of actor reasoning and interacting are required

Conclusion: objectives and answers and requirements

Diversity (ies)

Difficulty (ies)
Yes, biodiversity is a key component for natural pest control

There is a call for adaptation and management of biodiversity in the field

New modes of actor reasoning and interacting are required
Yes, biodiversity is a key component for natural pest control.

There is a call for adaptation and management of biodiversity in the field.

New modes of actor reasoning and interacting are required.

Conclusion: objectives answers and requirements
3
Key Takeaways
Take-away messages

Promoting vegetal biodiversity in ACP

1. Plant diversification improves natural crop protection against pests
2. Management of vegetal diversity in the agroecological systems is more complex than in conventional systems
3. New way of thinking and working for all actors
4. Need for a socio-ecological accompanies and support during the transition period
Thank You

CASIC 2nd Annual CA & SI and Agroecology Regional Workshop

28-29 September 2021
Virtual Workshop
CAMBODIA
Session 3: Managing Diversity in CA/SI Systems Adoption

Vietnam Experience on Tree Integration in Farm Systems

Dr. Clément RIGAL, Tropical agronomist at CIRAD
Integrating trees in intensive coffee farming systems
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Guiding existing transitions

Clément Rigal – September 29th, 2021
Understanding the existing transitions

1. Southwest China: intensive arabica coffee farms
   - Monoculture
   - Mixed agroforestry
   - Macadamia

2. Northwest Vietnam: intensive arabica coffee farms
   - Monoculture
   - Mixed fruit trees

3. Central Vietnam: intensive robusta coffee farms
   - Monoculture
   - Pepper
   - Durian, avocado and cashew

Transitions are already taking place. Trees are being planted, replaced, fell.

Fruit trees are preferred, to increase incomes. Farmers rapidly adapt their farming systems to changing conditions (especially price incentives). This leads to boom and bust phenomena, and economic vulnerability.
How to best guide these ongoing transitions?

➢ Acknowledging that these systems are intensive and will remain so (at least in the foreseeable future) => yield is favored over quality, mineral inputs are part of the recommended farming model.

➢ Acknowledging that short term benefits are key => fruit trees are part of the recommended farming model. How to best incorporate them and manage them?

➢ Improving the economic resilience to avoid boom and bust and favor long-term prospects => diversification is often key; coffee is no longer necessarily the main product from the recommended farming system.

➢ Identifying other important services that trees can provide => which services are most important/relevant? Which tree species, arrangement and management can provide them?

NB: Environmental services are important, but they are only part of the solution
Incorporating fruit trees

**Pros**
- Bringing economic benefits
- Benefiting from ongoing inputs (fertilizer, irrigation...)
- Requiring limited labour requirement

**Cons**
- Competitive for resources (light, nutrients, water)
- Can bring pests & diseases
- Can require different/incompatible management

Incompatible irrigation schedules

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<td>Coffee</td>
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Incorporating fruit trees

Guiding the transitions:
- We cannot avoid competition. But we can identify and avoid barriers/incompatibilities.
- Competition might lower coffee yield. It’s ok if the total output balances the coffee loss.
- Fine-tuning the system through improved spatial design and improved resource use efficiency = technical recommendations.
Other important services

Which ecosystem services are most important/relevant to smallholder farmers?

• Improved soil fertility?
• Resilience to climatic hazards?
• Improved pest control?
• Carbon sequestration?
• Biodiversity conservation?
• More pleasant working conditions?
Example of shade trees buffering a frost event in Southwest China (21/12/2017)

Under shade trees => no frost

Monoculture => frost

Leaves damaged by frost

C. camphora  B. javanica  J. mimostifolia  Open

Temperature (°C)

Time
We developed a tool to summarize the provision of ecosystem services by shade trees and help farmers select the shade tree species best adapted to their individual needs.

Available online at: www.shadetreeadvice.org

Example 1: farmer at high elevation in China who wants to protect coffee from frost & enhance soil moisture

⇒ Alstonia scholaris, Artocarpus heterophyllus, Bischofia javanica

Example 2: farmer near a road in China who wants to diversify his/her revenues

⇒ Litchi chinensis, Macadamia integrifolia, Dimocarpus longan, Mangifera indica
Summary

- Guiding/accompanying the existing transitions rather than pushing for entirely new systems

- A more sustainable coffee farming system could look like:
  - Coffee + mix of fruit trees for economic performances & economic resilience + other tree species for locally important ecosystem services
  - Avoiding major barriers/incompatibilities (common pests and diseases, concomitant rush for labour, distinct need for irrigation...)
  - Adapting farming practices to improve resource use efficiency

In the intensive context found in Southwest China and Vietnam
Thank you

Remember the link: www.shadetreeadvice.org
Regional Experience on Strengthening Agricultural Innovation System for Sustainable Agriculture Intensification

Dr. Selvaraju Ramasamy, Head of Research and Extension Unit, Office of Innovation FAO
Strengthening agricultural innovation system for sustainable agriculture intensification

Dr. Selvaraju Ramasamy
Head of Research and Extension Unit, Office of Innovation, FAO

28-29 September 2021
CAMBODIA
Background - issue at stake

Sustainable intensification

**IN THE PAST**

Focus on the sustainable intensification of agricultural production:
- Increasing agricultural productivity
- Closing yield gaps
- Food security
- Farm level
- Technological innovations

**TODAY**

Focus on the sustainable intensification of agrifood systems:
- Optimization - making optimal use of available agro-ecological, human and financial resources
- Food, income and nutrition security
- Farm and policy level
- Technological + other innovations
- Enabling environment
Background - agrifood system approach

**AGRICULTURAL INNOVATION**

The process whereby individuals or organizations bring existing or new products, processes and forms of organization into social and economic use to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability, thereby contributing to food and nutritional security, economic development and sustainable natural resource management.

**AGRICULTURAL INNOVATION SYSTEM**

A network of actors or organizations, and individuals, together with supporting institutions and policies in the agricultural and related sectors, that brings existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share and use knowledge, as well as jointly learn.

Sustainable transformation of agrifood system needs **innovation system approach** - integrating different elements together!
**Capacity development for sustainable agrifood systems**

**Sustainable intensification challenges are complex problems**

<table>
<thead>
<tr>
<th>Multi-dimensional</th>
<th>Integrated analyses and solutions</th>
<th>Capacity to navigate complexity</th>
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<tbody>
<tr>
<td>Multi-level</td>
<td>Coherent interventions across different levels</td>
<td>Capacity to engage in multi-level action</td>
</tr>
<tr>
<td>Multi-stakeholder</td>
<td>Collective action to identify, analyse, prioritise &amp; overcome problems</td>
<td>Capacity to collaborate and act together</td>
</tr>
<tr>
<td>Unpredictable processes</td>
<td>Iterative and learning oriented innovations</td>
<td>Capacity to reflect, learn and adapt</td>
</tr>
</tbody>
</table>
TAP is a G20 initiative, established in 2012 to promote greater coherence and impact of Capacity Development (CD) and knowledge sharing to strengthen National Agricultural Innovation System (AIS).
Key findings from AIS assessment in Cambodia:

- **Cambodia has made great strides in strengthening its AIS;** e.g., through developing the capacity of the agricultural research system to produce and disseminate new rice varieties and production technologies

- **Insufficient funding for agricultural research, development and extension** coupled with low salaries and no incentive system for research and teaching staff remains a critical issue

- **Platforms are needed to facilitate better coordination** and communication between AIS actors (e.g. agriculture research, higher education, extension and private sector)

- **A more coherent and supportive policy framework is needed** to support agricultural innovation (e.g., facilitate access to credit, update extension policy, etc.)
Weak capacity of key national institutions and linkages among them hinders uptake and scaling of sustainable agricultural intensification practices.

Three main organizations to strengthen in Cambodia:

• Cambodian Agricultural Research and Development Institute (CARDI)
  – The capacity to develop and communicate a Strategic Development Plan will be strengthened

• Cambodian Conservation Agriculture Sustainable Intensification Consortium (CASIC)
  – The capacity to conduct policy dialogue, influence policy processes and communicate policy messages (e.g. via policy brief) will be strengthened

• Department of Extension for Agriculture, Forestry and Fisheries (DEAFF)
  – The coordination among EAS providers strengthened, therefore information sharing and joint learning between extension workers at the local and national level will be strengthened

Strategic capacity development interventions at organizational level is important with focus on functional skills
Lack of policy and institutional instruments to bring people and actors to work together in interdisciplinary context.

• Establishment of national forum for EAS providers, led by DEAFF;
• Policy dialogue process to create enabling environment for innovation, led by CASIC;
• National research conference, organized by CARDI;
• Market Innovation Fair, facilitated by DEAFF with participation by CARDI and CASIC.
Strategic capacity development interventions at organizational level will strengthen functional skills to support agricultural innovation

Three main organizations to strengthen in Lao PDR:

• **Department of Technical Extension and Agro-Processing (DTEAP)**
  – The capacity to deliver demand-driven extension information, which is well-suited and easily understood by farmers will be strengthened

• **National Agriculture and Forestry Research Institute (NAFRI)**
  – The capacity to collaborate with relevant institutions (e.g., DTEAP) and farmers to facilitate participatory research in key areas (such as vegetable production) will be strengthened

• **Lao Farmer Network (LFN)**
  – The capacity for effective communication and sharing of market-oriented information (on production techniques, volume, etc.) among LFN members will be strengthened, with a special focus on women and youth

→ **Functional capacities of key national institutions and linkages among them need to be strengthened also to facilitate uptake and scaling of sustainable agricultural intensification practices.**
Closer research-extension-farmer collaboration, increased market orientation and a more favorable enabling environment will improve optimal use of human and financial resources, facilitate agricultural innovation and thus faster and appropriate uptake of sustainable intensification practices

- Mechanism (e.g., blog, other ICT-based method) to facilitate information delivery and sharing among farmers established at DTEAP
- Farmer Field School (FFS) for participatory research established by NAFRI in cooperation with DTEAP
- Agribusiness curricula tailored to the needs of women and youth, developed and in use by LFN
- Policy dialogue process to strengthen coordination among AIS actors, including DTEAP, NAFRI and LFN
Thank You

CASIC 2nd Annual CA & SI and Agroecology Regional Workshop

28-29 September 2021
Virtual Workshop
CAMBODIA

Food and Agriculture Organization of the United Nations

TAP-AIS project
Research and Extension Unit of FAO
Facilitator

Speakers

Q&A for Session 3

Dr. Hin Lyhour, Researcher and Department Head of Agricultural Machinery, Faculty of Agricultural Engineering at the Royal University of Agriculture (RUA).

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

Dr. Jean-Philippe Deguine, Senior scientist, agroecologist and entomologist at CIRAD (UMR PVBMT)

Dr. Clément Rigal, Tropical agronomist at CIRAD

Dr. Selvaraju Ramasamy, Head of Research and Extension Unit, Office of Innovation FAO