



UNITED NATIONS  
**ESCAP**  
Economic and Social Commission for Asia and the Pacific

CSAM



## Country: Indonesia

- 1) Indonesian Center for Agricultural Mechanization Standard Testing (ICAMEST) - IAAS  
Ministry of Agriculture
- 2) The University of Gadjah Mada





## *Implementation of Pilot Project of The CSAM Regional Initiatives (2022 – 2023)*

*Enabling Sustainable and Climate-Smart Agriculture in Indonesia through  
Mechanization Solutions for Integrated Management of Straw Residue  
and Air Pollution Monitoring*



# OVERVIEW OF THREE PILOT SITES IN INDONESIA

Focused on Special Regional of **Yogyakarta** Province, Indonesia, with approachment of **Hamlet-Village Boundary**

1. **Gamparan Hamlet**, Sumberharjo Village, **Prambanan** District

2. **Kwasen Hamlet**, Srimartani Village, **Piyungan** District

3. **Japuhan Hamlet**, Sumbermulyo Village, **Bambanglipuro** District

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
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Google Earth



# GENERAL OVERVIEW OF THE THREE PILOT SITES



**Gamparan Hamlet**



**Kwasen Hamlet**



**Japuhan Hamlet**

Point of Consideration	Gamparan Hamlet	Kwasen Hamlet	Japuhan Hamlet
Agricultural land area (ha)	15.38	17	10
Agricultural productivity (rice ton/ha)	6.8	7.7	7.8
Member of farmers group (in the baseline survey)	12	18	25
Member of women farmers group (in the baseline survey)	11	11	10
Land topography	Highland	Lowland	Lowland
Crop cycle per year	3	3	3
Agricultural product per cycle	Paddy-paddy-second crop	Paddy – paddy – second crop	Paddy – corn – second crop
Existing agriculture machinery ownership in the group	A few	A few	None (borrow or rent)
Agricultural Mechanization	Semi manual	Semi manual	Semi manual

All of the three pilot sites have implemented **Integrated Crop and Livestock farming system**

# GAP ANALYSIS

**Prior Sub-Optimal Conditions of Straw Residue Management in The Pilot Sites in Indonesia**

- **Sub-optimal training and knowledge of the farmers and women farmers** in their participation for straw management
- **Lack of awareness and training** for implementing straw management (fermented feedstock, composting, organic fertilizer, etc)
- **Low participation** from the farmers in the implementation of straw management, especially targeting to millennial young farmers's participation
- **Lack of agricultural machineries and technology** to support implementation of straw management
- **Sub-optimal condition and agricultural machinery supports** for the implementation of straw management

**OPTIMAL CONDITION:**  
Integrated Management of Straw Residue through Agricultural Mechanization Solutions

*Agricultural Mechanization-based Implementation*

*Based on Specific Stages and Needs*



# PRIOR CONDITION OF STRAW MANAGEMENT IN THE PILOT SITES







## Mechanization Interventions



# Training and Workshop Related to Straw Management Practices and Air Pollution Monitoring

## INVOLVED PARTIES

1. **UGM**, Local Government, Agricultural Extension Workers
2. **UGM** and Local Industry
3. **UGM**, ICAMEST, Local Govt.
4. **UGM**
5. **UGM**
6. **UGM**
7. **UGM** and ICAMEST
8. **UGM** and **CSAM**  
(in conjunction with Disemination and Demonstration Sessions)

## TRAININGS AND WORKSHOP

1. Introduction of straw management, sustainable agriculture, policy, and regulation of straw burning prohibition
2. Introduction and how to operate the agriculture machinery
3. Training of agriculture machineries - *on farm stage + field trial*
4. Training of agriculture machineries – *harvest and post harvest + field trial*
5. Training of agriculture machineries – *utilization: fermented feed making*
6. Training of agriculture machineries – *utilization: composting*
7. Training of maintenance and management of agriculture machineries
8. Workshop of How to utilize satellite imagery and seasonal air pollution modeling to mitigate effects of agricultural burning (*blended*)

- **All trainings conducted in the pilot sites equally**
- **Total training: 21 times (7 training per site)**

***For Community Development***



# Mechanization-based Interventions Implemented at The Pilot Sites

## Straw Management Implementation

ON FARM

HARVEST

POST  
HARVEST

STORAGE/  
UTILIZATION

- *Composting*
- *Fermented feed making*
- *Pressed straw storage*

## Implemented agriculture machineries based on specific per stage and needs:

- Handy straw cutter
- Hand tractor of straw cutter – Mower
- Trailer / straw transportation

- Mobile rice power tresher
- Mobile corn power tresher\*
- Trailer / straw transportation

- Chopper
- Grinder\*
- Customized straw pressing machine
- Trailer / straw transportation

- Chopper
- Grinder
- Sprayer
- Rotating Compost Sieve
- Trailer/straw transportation

- 7 and 8 (\**Japuhan only*) agriculture machineries have been equipped and implemented per pilot sites
- All agriculture machineries were equipped, delivered, and officially handedover **completed in January 2023**



# Mechanization-based Interventions Implemented at The Pilot Sites

**ON FARM**



**HARVEST**





# Mechanization-based Interventions Implemented at The Pilot Sites

## POST HARVEST



## STORAGE/ UTILIZATION



- *Composting*
- *Fermented feed making*
- *Pressed straw storage*



# Machinery Modification



## Modification of Customized Straw Pressing Machine:

- Straw pressing practice in Indonesia is still not common.
- The modification was done by adding cage wheel for easier operation and movement.



## Modification of Hand-tractor with addition of straw cutter / Mower:

- Adding cage wheel to add traction for easier operation in wet land
- Attached the straw cutter to the hand tractor for cutting the left-over straw in the field



## Modification of Trailer/ Straw Transport:

- Changing type of wheel for easier operation and attachment to the hand tractor





## Awareness and Demonstration Sessions



# Field Trials & Training of Straw Residue Management



All machineries have been field tested in conjunction with demonstration and trainings of straw management practices



# Field Trials & Training of Straw Residue Management



Trainings of straw management practices with the expert practitioners (Virgian Pastawan, Ph.D and Dimas Handa Vidya Paradhipta, Ph.D) regarding to:

- Composting
- Silages making





# Japuhan Hamlet – Bambanglipuro District (12 – 15 January 2023)



- **Eight agricultural machineries** were officially handedover to the farmers group and women farmers group in Japuhan Hamlet, followed by demonstration and dissemination, such as straw pressing machine
- **FGD evaluation** was lead by the practitioners for reviewing and evaluating straw management practices,
- **Transfer knowledge** was also facilitated in the form of booklets of informational material that shared to all participants





## Kwasen Hamlet – Piyungan District (20 – 22 January 2023)



- **Seven agricultural machineries** were officially handedover to the farmers group and women farmers group in Kwasen Hamlet, followed by demonstration and dissemination, such as straw pressing machine
- **FGD evaluation** was lead by the practitioners for reviewing and evaluating straw management practices in separate occasion
- **Transfer knowledge** was also facilitated in the form of booklets of informational material that shared to all participants

**FGD evaluation from the participants in Kwasen Hamlet stated the challenges as follow:**

- (1) how to differentiate and indicate that fermented feed has reached well condition and finished,
- (2) how to ensure and indicate the safety of well-made fermented feedstock,
- (3) duration of straw management process still takes time



# Gamparan Hamlet – Prambanan District (23 - 25 January 2023)



- In this occasion, **demonstration and dissemination** were joined by all participants from three pilot sites (**105 participants**)
- **FGD evaluation** was lead by the practitioners in separate day
- *Big Event of Rice Harvesting of MT 2 at Gamparan Hamlet*
- **Feedback survey** was done filled by all participants in this occasion
- **Workshop** of Air Pollution Monitoring using satelite imagery was done by blended method
- **Transfer knowledge:** booklets of informational materials were shared and discussed



# ACHIEVEMENTS TO PROGRAM OUTCOME AND OUTPUT INDICATORS

**The Project Objective:** improved crop residue management and air pollution monitoring for sustainable and climate-smart agriculture

**Achievement** : straw residue management in the stage of on farm and post harvest have been improved (25 – 35% compared to prior conditions)



**The Project Outcome:** Farming community and change agents implement improved technologies and practices and evidence-based decision-making supported by innovative air pollution monitoring approaches, for integrated management of straw residue

**Achievement** : the trained farmers and women farmers group have implemented most of the improved technologies and straw residue management practices in the program



**The Project Indikator** : By end of the project, **at least 50%** increase in amount of straw sustainably utilized through improved technologies and practices and evidence-based decision-making supported by innovative air pollution air pollution monitoring approaches at the pilot site

**Achievement** : The amount of straw sustainably utilized was still **25 – 35%**.  
The pilot sites have just fully equipped in **January 2023** and the monitoring range of the program has only been done for **less than a year** (6 months monitored since first procurement in October 2022)

However, three points of detailed output indicators have been accomplished during the implementation program



## **Next phase 2024-2027**

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Strengthening mechanization-based solutions for climate-smart crop residue management in Indonesia



# Proposed Activities



## **Training and testing machine**

sustainable straw management training  
evaluate the condition of the machine  
on site  
machine modification and replacement  
of spare parts if necessary



## **Demonstration the project**

presentation of program success at  
regional forums  
development of programs to  
surrounding areas



## **Improving facilities as a pilot project**

increasing farmers' abilities for business  
development  
improving facilities and buildings as a  
model



## **Discussion of regulations related to straw management**

discussion of regulations involving the  
ministry of agriculture, universities and  
farmers





# Pilot Locations

- Learning center : Yogyakarta
- New Pilot site : Bojong Kamal Village, District of Tangerang, monoculture (rice), extensive use of chemical fertilizer, the pilot site to be testing of selective agricultural machinery for straw management and recycled into products (composts, feed, mushroom)



**KOMTEK 65-04**  
**KOMITE TEKNIS**  
**SARANA DAN PRASARANA**  
**PERTANIAN**

BALAI BESAR PENGUJIAN STANDAR INSTRUMEN MEKANISASI PERTANIAN



AGROSTANDAR  
SEKRETARIAT KOMITE TEKNIS 65-04  
BALAI BESAR PENGUJIAN STANDAR  
INSTRUMEN MEKANISASI PERTANIAN  
(021) 75675918  
081213276363  
<http://mekanisasi.litbang.pertanian.go.id>  
[bbpmektan@litbang.pertanian.go.id](mailto:bbpmektan@litbang.pertanian.go.id)  
[bbpmektan@gmail.com](mailto:bbpmektan@gmail.com)



## KONTAK

 (021) 75675918 / WA : 081213276363

 <https://mekanisasi.bsip.pertanian.go.id>

 [bsip.mektan@pertanian.go.id](mailto:bsip.mektan@pertanian.go.id)

Jl. Sinarmas Boulevard  
Situ Gadung, Kec. Pagedangan  
Kab. Tangerang - Banten  
Indonesia  
15338

Technical Committee for National Standards 65-04  
Field : Agriculture Infrastructure



# Dissemination & National Standard (SNI)



- SNI 6729-2016 SISTEM PERTANIAN ORGANIK - applied
- Dissemination of Agricultural machineries for integrated straw management (chopper, granular fertilizer – paddy mower, reaper binder, baller etc.)
- SNI refer to ISO/IEC 59000 circular economy



2016).

## LINEAR ECONOMY



## CIRCULAR ECONOMY





## Integrated Straw Management – Mechanization solutions

- Participation of more stakeholders including Agricultural Machinery Producers and Distributors, Scientists and Reserachers
- ICAMEST provide testing laboratory for tailor made agricultural machinery including imported machinery adopted in Indonesia
- Pilot Locations
- Sustainable mechanization adoption





THANK YOU

TERIMA KASIH

