

REPORT

PILOT PROJECT ON “INTEGRATED STRAW MANAGEMENT IN VIETNAM

(2018-2019)

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OBJECTIVES AND ACTIVITIES OF THE PROJECT

** General objectives*

- + Reduce in-field straw burning and greenhouse gas emission,
- + Utilize efficiently the rice straw source,
- + Return nutrients from rice straw to the soil,
- + Orientate toward a sustainable agriculture for Vietnam.

** Specific objectives*

- + Apply “In-door rice straw mushroom growing technology” successfully in Can Tho City, the MRD,
- + Improve yield, quality and value of the mushroom and income of the mushroom growers,
- + Create more jobs for the rural people.

** Scopes and activities*

- + Carried out a preliminary investigation on rice straw management, and rice straw mushroom growing technologies and models in Can Tho City and the MRD,
- + Established successfully a pilot site on “In-door mushroom growing technology” in Can Tho City,
- + Organized successfully an inception workshop-cum-training on “In-door rice straw mushroom growing technology”, and demonstrated the pilot site to the workshop participants in Can Tho City in January 2019.

PART II

CURRENT STATUS ON RICE STRAW MANAGEMENT IN THE MEKONG RIVER, VIETNAM

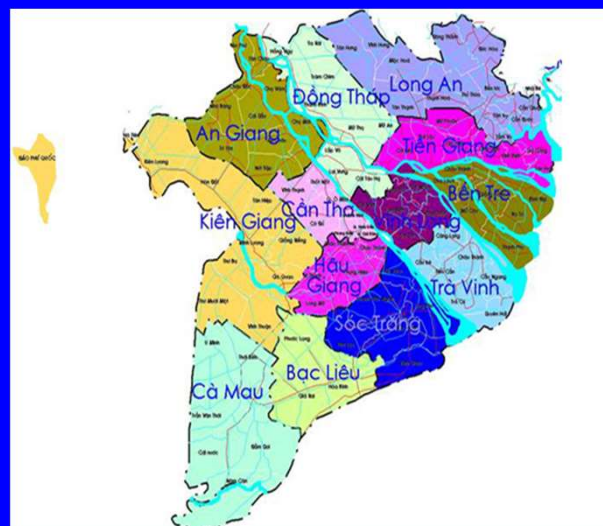
RICE PRODUCTION IN VIETNAM & MEKONG RIVER DELTA

* Vietnam



- Total population (persons): 97,678,389 (2019)
- Totally natural land area (mil. hectares): 33
- Total land area for rice production (mil. hectares): 3.8
- Totally annual rice harvested area (mil. hectares/year): 7.44
- Total paddy output (mil. tons/year): 44-45
- Total milled rice export (mil. tons/year): 6 - 8
- Total rice export value (Billion of US Dollar/year): 3.2 – 3.7

* The Mekong river delta



- Population (mil. persons): 17.274 (occupying 17.95% total population)
- Natural land area (mil. hectares): 4.0 (13% of the total)
- Agricultural land area (mil. hectares): 3.8
- Land area for rice production (mil. hectares): 2.1
- Annual rice harvested area (mil. hectares/ year): 4.3 (occupying 47% of the country)
- Paddy output (mil. tons /year): 23-25 (occupying 56% the total productivity)
- Milled rice export: Occupying 90% of the total

MOST OF RICE STRAW LEFT OR BURNT OUT IN THE FIELDS AFTER HARVEST



Burning rice straw in fields after the harvest



**Leaving rice straw in
fields after harvest**

STRAW BALERS BEING USED POPULARLY IN THE MRD



- + Types: STAR MRB 0855T & MRB 0850 manufactured by HI Star Machinery Corporation of Japan)
- Rolling capacity: 80-120 rolls/hour (5 -7 hectares/day),
- Dimensions of straw rolls (D*L): 50*70cm
- Weight of straw roll: 15kg/roll



Modified Japanese baler in Soc Trang province



+ Local manufactured straw balers with a storing tank in the back: Phan Tan or Tu Sang mechanical enterprises



RICE STRAW FOR MUSHROOM GROWING IN THE MRD



**Mushroom growing using Out-door
methods in Dong Thap province, the
MRD**

RICE STRAW FOR MULCHING OF FRUIT TREES OR VEGETABLES



**Rice straw used as mulching material for
ornamental crops or vegetables in Can
Tho City**

**Rice straw used as mulching material for
dragon fruit trees in Tien Giang
province**



RICE STRAW USED AS CATTLE FEED



PART III

PRELIMINARY INVESTIGATION ON POPULARLY RICE STRAW MUSHROOM GROWING TECHNOLOGIES IN THE MRD

OUT-DOOR MUSHROOM GROWING (IN LAI VUNG OF DONG THAP PROVINCE)



Buying rice straw from many zones in the MRD



Wet and soft rice straw incubated in large piles of 1.5-1.8 meters width and 1.4-1.6 meters height within 7 to 13 days



In-field mushroom growing



On- ground mushroom growing

IN-DOOR IMPROVED RICE STRAW MUSHROOM GROWING (IN THOI LAI OF CAN THO CITY)

An improved rice
straw mushroom
growing house



Harvest of the mushroom grown in houses



USES OF SUBSTRATE AFTER MUSHROOM GROWING IN CAN THO CITY



Substrate after mushroom growing in Binh Thuy of Can Tho City



Substrate for improving of soil fertility in O Mon of Can Tho City



Substrate treated with Trichoderma for growing of ornamental plants or flowers in Thot Not of Can Tho City



Substrate after Trichoderma treatment used for ornamental growing in Binh Thuy of Can Tho City

IN-DOOR MUSHROOM GROWING METHOD COMPARED WITH OUT-DOOR MUSHROOM GROWING METHODS

+ ADVANTAGES:

- Better control of the growing conditions,
- Lower application of chemicals,
- Higher yield and quality of the mushroom,
- Growing year around (7-9 growing cycles/year with 35-40 days/growing cycle),
- Lower labor cost for harvest,
- No need for change of growing sites,
- More efficient use of land for mushroom growing,
- Much higher income and profit.

+ DISADVANTAGE:

- Higher initial investment cost.

COMPARATIVE ANALYSIS OF OUT-DOOR & IN-DOOR MUSHROOM GROWING METHODS

Comparison Criteria	Out-door Method	In-door Method (Simple Thatched Shed)
Investment in growing house (mln. VND)	0	150
Growing cycles (no. of mushroom cycles/year)	1-2	8-9
Mushroom yield (kg of mushroom/meter of bed per cycle)	0.7-0.9	1.67
Mushroom production cost (thousand VND/kg of mushroom)	17.71-22.06	29.99
Selling price of mushroom (thousand VND/kg of mushroom)	24.00-32.05	44.12
Specific profit (thousand VND/kg of mushroom)	6.29-11.11	14.13
Annual profit (mln. VND/1,000 meters of bed per year)	19.99	211.96

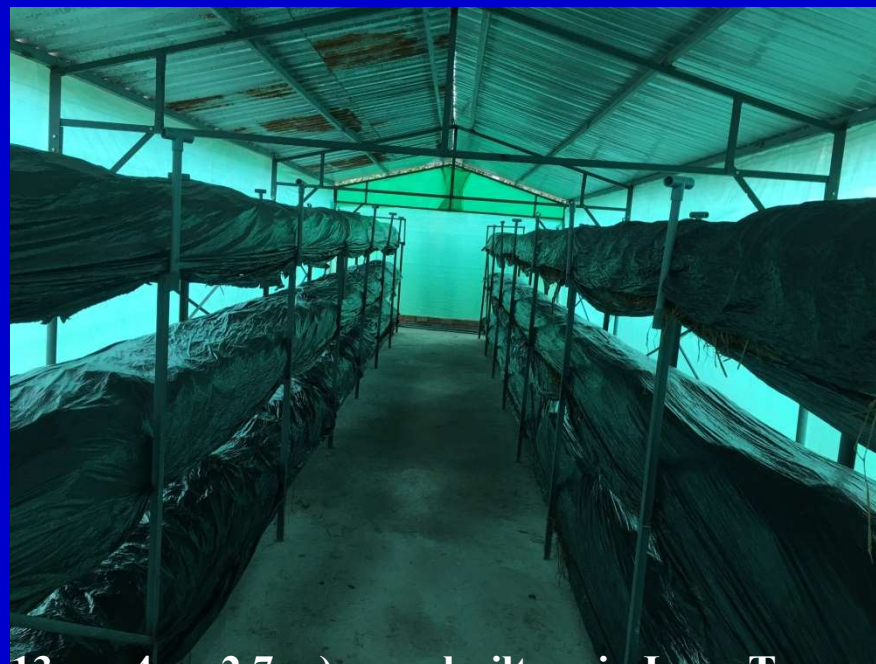
FINDINGS FROM THE PRELIMINARY INVESTIGATION ON RICE STRAW MANAGEMENT IN THE MRD

- + Recently, most of rice straw is burnt or left in the fields after harvest;**
- + Lack of means for collection and transportation rice straw in fields;**
- + Rice straw is used for various purposes such as: cattle feed, mulching of fruit trees and vegetables, mushroom growing, natural fertilizer for various crops,**
- + Mushroom is grown in the Mekong river delta using mostly out-door methods,**
- + Annual income of mushroom growers increases 1.5-2.0 times compared with that of rice growers,**
- + Mushroom processing technology in the MRD is still poor with low added value,**
- + Quality and yield of mushroom from In-door growing method are much higher than those of the Out-door method,**
- + For In-door growing methods, mushroom can be grown in simple thatched sheds or metal roofing simple sheds,**
- + The In-door mushroom growing technology has just begun, and not been yet out-scaled widely in the MRD due to:**
 - Highly initial investment cost,**
 - Lack of good designs of growing houses,**
 - Lack of good mushroom growing models, and**
 - Lack of training courses on In-door mushroom growing technology.**
- + Therefore, the CSAM project should focus to solve the problems above**

PART IV

ESTABLISHMENT AND TESTING OF THE “IN-DOOR RICE STRAW MUSHROOM GROWING TECHNOLOGY” PILOT

STRUCTURE OF THE MUSHROOM GROWING HOUSES

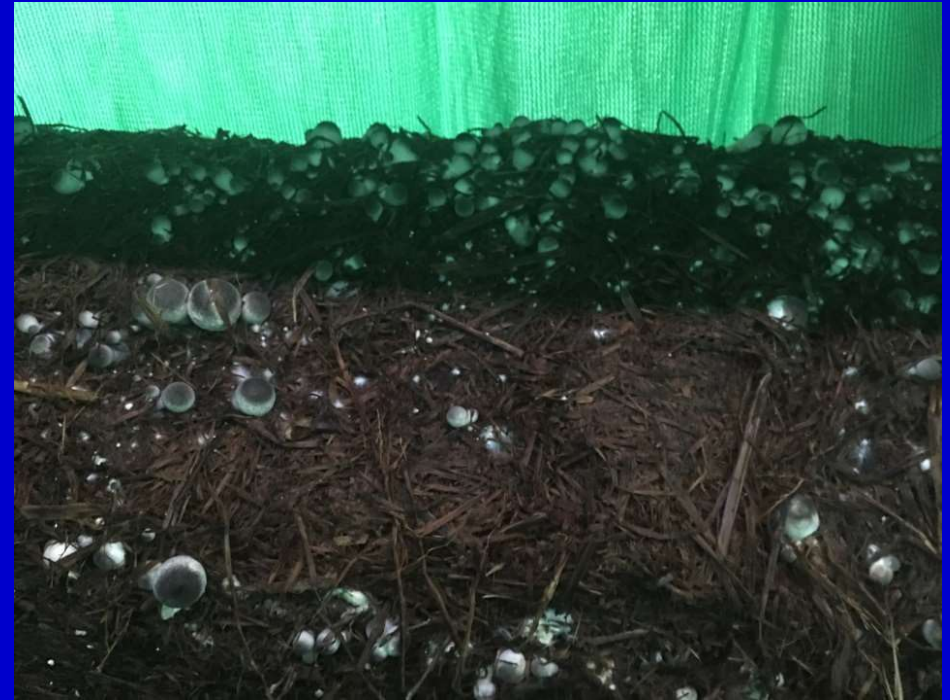


- + Two metal roofing houses of 52m² (L x W x H: 13m x 4m x 2.7 m) were built up in Long Tuyen Ward, Binh Thuy District of Can Tho City,
- + Each growing house has cement floor, steel frame, corrugated steel roof and plastic walls,
- + Height of the surrounding walls is 2 meters, lower than the peak of the roof,
- + Space between surrounding walls and the floor is for entering fresh air; and space on top of the roof is for exhausted air,
- + Inside each mushroom growing house, there are three steel shelves (L*W*H : 12m*0.5m*1.3m) on each side to put rice straw blocks inoculated with mushroom spawn,
- + A water supplying system with a 500 liter-water tank and a water pump was also installed at the site to spray water on inoculated rice straw blocks and to maintain suitable RH level of the air inside the mushroom growing houses.

PREPARATION AND GROWING OF MUSHROOM IN HOUSES

* Inputs:

- + Two mushroom growing houses of 104 m²,
- + 3,500 kg of rice straw at moisture content of 70%wb (approx. 1,482 kg of dried rice straw at 11%wb) sterilized and further inoculated with spawn was taken into the two growing houses,
- + Temperature and RH of air: 30-32°C & 85-95%
- + Straw block temperature maintained at 37°C,
- + After 3 or 4 days, egg-shaped mushrooms appeared,
- + About 12 days after inoculation with spawn, the mushroom in the growing houses was harvested.



HARVEST OF MUSHROOM FROM THE GROWING HOUSES



* **Outputs:**

+ Total harvested mushroom: 385kg,

+ 26 kg mushroom/ 100 kg of rice straw at 11%wb,

+ Growing efficiency: Approx. 26% compared with only 13-15% by the traditional mushroom growing methods,

+ 1,000kg of chopped rice straw substrate was enriched with 200-500g of Trichoderma, 10 kg of lime powder, 7kg of urea (Nitrogen), 20kg of super phosphate, 8kg of KCl and 10kg of rice bran,

+ The mixture was stacked into a pile of 1.2-1.5 m high, covered with plastic sheets and maintained at temperature and RH of 40-50°C and 60-70%, respectively,

+ The mixture was turn up evenly every 10-15 days,

+ The decomposing process lasted 55 days,

+ 3,000 kg of the rice straw substrate was used as natural fertilizer to cover the area of 2,000 m² of vegetables and ornamental plants and around 50 matured fruit trees in Can Tho City. It helps reduce application of chemical fertilizer (approximately 80 kg NPK fertilizer) and lowered production cost of crops (approximately US\$ 80-100).

PART V

**INCEPTION WORKSHOP- CUM –
TRAINING ON “IN-DOOR RICE STRAW
MUSHROOM GROWING TECHNOLOGY”**

INCEPTION WORKSHOP-CUM-TRAINING ON “IN-DOOR RICE STRAW MUSHROOM GROWING TECHNOLOGY”

- + Duration: One day, 23/01/2019**
- Workshop & training in the morning**
- Demonstration of the pilot site in the afternoon**
- + Location: Can Tho City, the Mekong river delta**
- + Participants: 49 participants from Can Tho Uni., Dong Thap Uni., provincial agricultural departments of Can Tho & Dong Thap; agri. extension centers, divisions of crops and plant protection, farmer associations and mushroom growers from Can Tho City and other neighbor provinces; and media agencies;**
- + Outputs: The event helped the participants change knowledge, attitude and action related to rice straw management, and recognize benefit resulted from In-door rice straw mushroom growing technology.**

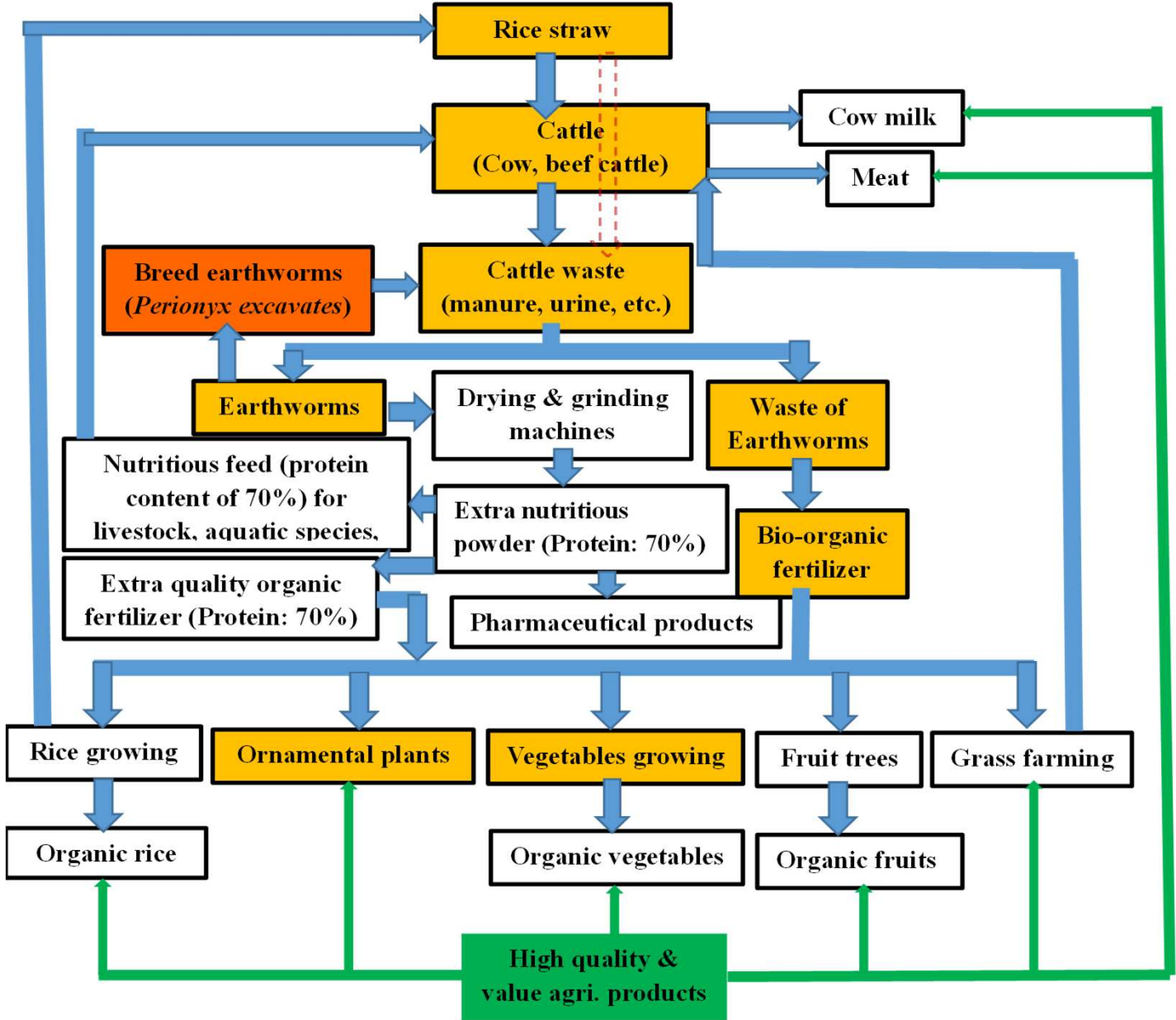
SOME PHOTOS TAKEN FROM THE INCEPTION WORKSHOP – CUM – TRAINING IN CANTHO CITY



PART VI

SUGGESTION ABOUT CSAM PROJECT ACTIVITIES IN VIETNAM (2020-2021)

DIAGRAM OF INTERMEDIATE & FINAL PRODUCTS GENERATED FROM RICE STRAW AND CATTLE



OBJECTIVES OF THE PROJECT

**** General objectives***

- + Reduce in-field straw burning and greenhouse gas emission,**
- + Utilize more efficiently the rice straw source,**
- + Return nutrients from rice straw to the soil,**
- + Orientate toward a sustainable agriculture for Vietnam.**

**** Specific objectives***

- + Develop successfully the “Cattle farm integrated with earthworm farming using rice straw” model in Can Tho City,**
- + Improve considerably income of the dairy farm,**
- + Minimize environmental pollution caused by the animal wastes,**
- + Supply more bio-organic fertilizer and nutritious feed to the MRD contributing to a sustainable development of the agriculture in MRD.**

MAIN ACTIVITIES OF THE PROJECT

- + Organize a preliminary survey of current status on using rice straw for cattle husbandry, and cattle waste (especially cow dung) management in Can Tho City and other main provinces in the MRD,**
- + Establish a demonstration site of “Earthworm raising using cattle manure” in the MRD, Vietnam;**
- + Organize one training course on “Earthworm raising techniques using cow dung in dairy farms” for around 20-25 local dairy farmers in Can Tho City,**
- + Organize a training workshop on “Earthworm raising techniques using cow dung in dairy farms” in Can Tho City for around 20 various stakeholders (governmental official, extension managers, dairy farmers, rice straw suppliers, traders and consumers of organic fertilizers and breed earthworms, and crop growers),**
- + Host a study tour for the teams of CSAM Pilot Project on Integrated Straw Management from China, Nepal, India and other interested stakeholders .**

OUTPUTS & OUTCOMES OF THE PROJECT

*** OUTPUTS:**

- + A pilot project proposal on “Cattle farm integrated with earthworm farming using rice straw” in the MRD, Vietnam;
- + A demonstration site of “Earthworm raising house using cow dung” in the MRD,
- + Capacity building: Changes in Knowledge, Attitude and Actions of governmental officials, agri. extension agents, dairy farmers, rice farmers and other international CSAM teams related to using rice straw for cattle feed and using cattle dung for earthworm raising as well as benefit resulted from the integration.

*** OUTCOMES:**

- + More jobs for the rural people,
- + Higher income for the dairy farmers,
- + Less negative impacts to the environment caused by the cattle wastes.

*THANK YOU VERY MUCH
FOR YOUR ATTENTION*

