REPORT

PILOT PROJECT ON "INTEGRATED STRAW MANAGEMENT IN VIETNAM"

By Pham Van Tan, PhD. Deputy Director
Sub-Institute of Agricultural Engineering & Post-harvest Technology (SIAEP)

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RICE PRODUCTION & RICE STRAW IN VIETNAM & MEKONG DELTA

+ Total Vietnam population (persons): 94 million
+ Total Vietnam land area (hectares): 33 million
+ Land area for rice production in VN (hectares): 3.8 mil.
+ Rice rotation (rice crops/year): 2 - 3
+ Total harvested rice area in VN (hectares/year): 7.44 mil.

*** Role of rice production in Vietnam**

+ Staple food for Vietnamese
+ Jobs for 63% of the total labor force
+ National food security
+ Base for industrial development
+ Total paddy rice output (mil.tons/year): 45-46

(in which the Mekong river delta occupies 56%)

+ Total milled rice for export (mil.tons/year): 7-8

(in which the Mekong river delta contributes up to 90%)

+ Total rice straw residues (mil.tons/year): ~ 45

(in which the Mekong river delta occupies about 55%)

BURNING RICE STRAW AFTER HARVEST IN THE MEKONG RIVER DELTA

POPULAR METHODS OF RICE HARVEST & SOIL PREPARATION IN THE MEKONG DELTA

In dry seasons

In wet seasons

Incorporation of straw into soil

VARIOUS STRAW BALERS USED POPULARLY IN THE MRD

Straw balers for working on dried soil

+ Types of 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 one straw roll: 15kg/roll

A Japanese baler modified for working on wet soil in the Mekong delta

+ Local self-propelled straw balers with a storing tank in the back manufactured by Phan Tan or Tu Sang mechanical enterprises

* Vietnam government has issued policies encouraging farmers to reduce rice straw burning; and providing financial supports (with 100% of bank interest rate in the first 2 years and another 50% of that from the third year onward over the total investment cost) to buy straw balers.

POPULAR USES OF RICE STRAW IN THE MEKONG RIVER DELTA

* Mushroom growing: The rice straw substrate after mushroom growing cycle used as natural fertilizer for various crops

* Mulching material for fruit trees or vegetables: To keep moist, warm for soil and to suppress weeds

* Cattle feed: Cows, buffaloes, etc.

MAIN CHALLENGES FOR RICE STRAW MANAGEMENT IN THE MEKONG DELTA

+ Most of rice straw is burnt or left in the fields after harvest, especially in wet seasons;

+ Rice straw collected in wet seasons could not be stored safely long time for various uses;

+ Lack of means for collection and transportation rice straw in fields, particularly in remote locations far away from transportation roads;

+ Mushroom is grown in the Mekong river delta using mostly out-door methods which have disadvantages as follows:

- Dependent heavily on weather conditions causing lower yield;

- High chemical application causing low quality for mushroom;

- Low number of annual growing cycles;

- Low efficiency in land use for mushroom growing,

- Annual change in growing sites to avoid contamination of diseases.

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

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 rotation (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

CONSTRAINTS FOR IN-DOOR MUSHROOM GROWING IN THE MEKONG DELTA

+ The In-door mushroom growing technology has just begun, and not been yet out-scaled widely in the MRD due to contraints as follows:

- **Highly initial investment cost,**
- **Lack of good designs of growing houses,**
- **Lack of successful mushroom growing models, and**
- **Lack of training courses on In-door mushroom growing technology.**

+ Therefore, the CSAM project should focus to overcome the contraints above

OBJECTIVES AND ACTIVITIES OF THE PROJECT

** General objectives*

+ Reduce in-field straw burning and greenhouse gas emission,

+ Utilize efficiently the rice straw residues,

+ Return nutrients from rice straw to the soil,

+ Orientate toward a sustainable agriculture for Vietnam.

** Specific objectives*

+ Improve yield, quality and value of the mushroom; and enhance income of the mushroom growers,

+ Create more jobs for the rural people,

+ Apply "In-door rice straw mushroom growing technology" successfully in Can Tho City, the MRD.

** 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 a pilot site on "In-door mushroom growing technology" in Can Tho City,

+ Organized 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.

STRUCTURE OF THE MUSHROOM GROWING HOUSES

+ Two metal roofing houses of 52m^2 (L x W x H: 13m x 4m x2.7 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 m^2,

+ 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^oC & 85-95%

+ Straw block temperature maintained at 37^oC,

+ 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^{o}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 m^2 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).

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

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 plan 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.

THANK YOU VERY MUCH FOR YOUR ATTENTION