

COLLECTION & USES OF RICE STRAW IN THE MEKONG RIVER DELTA, VIETNAM

Presentation by

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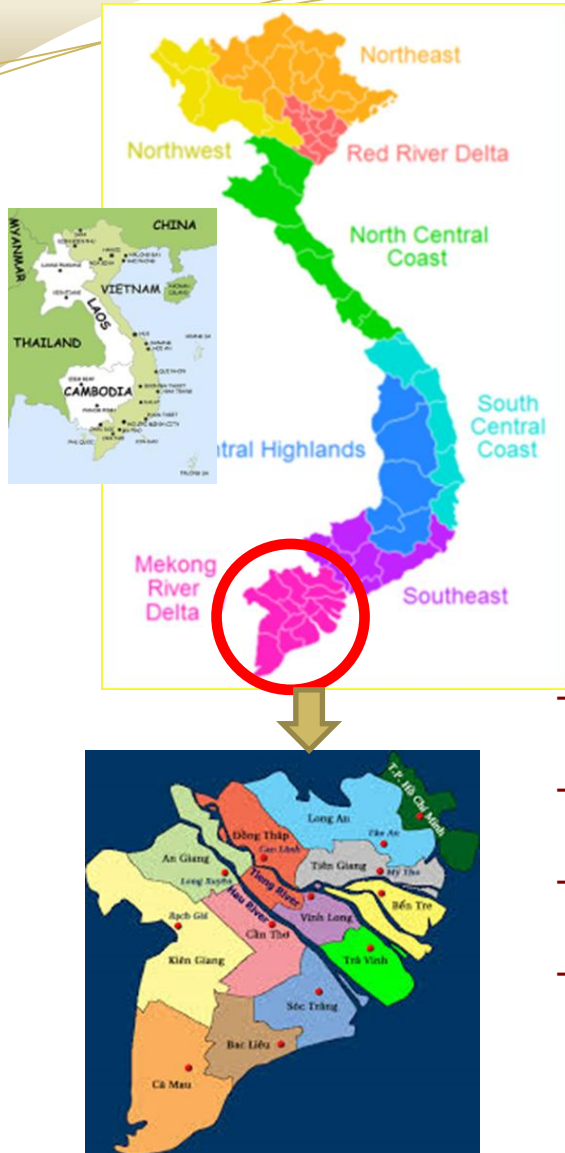
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PART I

RICE PRODUCTION IN VIETNAM

BACKGROUND OF VIETNAM



Total population (persons): 92 million

Total land area (hectares): 33 million

Land area for rice production (hectares): 3.8 mil.

Area of rice production (hectares/year): 7.44 mil.

*** Role of rice production**

Staple food for Vietnamese

Jobs for 63% of the total labor force

National food security

Base for industrial development

EXPORTED RICE OF VIET NAM

Year	Exported volume (tons)
1989	1,400,000
1996	3,234,000
2004	4,063,000
2007	4,443,000
2008	4,769,000
2009	6,052,596
2010	6,800,000
2011	7,000,000
2012	8,000,000
2013	6,739,000
2014	6,500,000
2015	6,568,000

(Source: Vietnam Food Association (VFA), 2016)

BACKGROUND OF THE MEKONG RIVER DELTA, VIETNAM

- * 3.9 mil. hectares of the natural land including 3.8 hectares of the agricultural land
- * 1.9 mil. hectares for rice production with # 3.8 mil. hectares of rice crops/year
- * Paddy output: > 24 mil. tons/year, occupying > 50% of the total country output
- * Milled rice export: 90 - 95% of the total country export
- * Aver. rice farming household size: 1.1 hectares. In which
 - 113,190 households (7.7%) own less than 0.2 hectares
 - 449,886 households (30.64%) own 0.21-0.5 hectares.
- * Popular farming models: 3 rice crops/year, Rice-rice-vegetables, Rice-fish or Rice-shrimp

PART II

VALUES OF RICE STRAW



COMPARISON OF ELEMENTS BETWEEN DIFFERENT MATERIALS

Elements(% db)	Husk	Straw	Wood
Carbon	38,7	37,7	48,0
Hydrogen	5,0	5,0	6,5
Oxygen	36,0	37,5	43,0
Nitrogen	0,5	0,6	0,5
Sulphur	0,1	NA	NA
Ash	19,6	19,2	2,0

	Nutritional values (kg/ton)				
	N	P ₂ O ₅	K ₂ O	Mg	Ca
Paddy grain	10,5	4,6	3,0	1,5	0,5
Rice straw	7,0	2,3	17,5	2,0	3,5

PART III

INVESTIGATION ON USES OF RICE STRAW IN THE MEKONG RIVER DELTA

CONTENTS, METHODS & SCOPES OF THE INVESTIGATION

* *Contents of the investigation:*

- Rice straw for mushroom production
- Rice straw for fertilizer production
- Rice straw for animal feed
- Rice straw for other purposes

* *Method of the investigation:*

- Collection of secondary information combined with a survey and personal interviews with specialists

**** Scopes of the investigation:***

- **Ho Chi Minh City: Trang Sinh mushroom company, at the Hi-tech Agricultural Park;**
- **Trang Bang Dist., Tay Ninh province: M.D Genetic Organic Milk Join Stock Company;**
- **Cu Chi Dist., Ho Chi Minh City: Dairy farms of Duc Den and Sau Hen, Thanh Binh animal husbandry, trading, production and service enterprise;**
- **Cho Gao Dist., Tien Giang province: VietGAP Dragon Fruit Co-operative and another one Trading Enterprise of Rice straw and Cassava by-products at Quon Long village;**
- **Lai Vung Dist., Dong Thap province: 2 mushroom producing farms, 1 mushroom trader and another one trader of mushroom spawn;**
- **Thot Not Dist., Can Tho City: A farmer/trader of in-door mushroom production, and trading of rice straw and mushroom; 1 dairy co-operative and another 3 dairy farms;**
- **Soc Trang province: 3 dairy farms, 1 milk collection co-operative, 1 trader of rice straw, and another one mushroom processing company for export.**

BURNING RICE STRAW AFTER HARVEST IN THE MEKONG RIVER DELTA



EFFECTS OF BURNING OF RICE STRAW IN THE FIELD ON LOSSES OF ITS ELEMENTS

Rice straw and its elements	Output per hectare after harvest (kg)	Losses due to burning of rice straw in the field (%)	Remaining of elements in the field (%)
Rice straw	6,000	100	0
N	51.5	100	0
P₂O₅	25.4	25	75
K₂O	137.4	20	80
Ca, Mg, Si		100	0

EFFECT OF BURING RICE STRAW ON ROAD TRANSPORTATION AND NATURAL ENVIRONMENT



OUT-DOOR MUSHROOM PRODUCTION IN THE MEKONG RIVER DELTA



Out-door mushroom production in Lai Vung district of Dong Thap province



Mushroom production in banana plantation in Lai Vung district of Dong Thap province



IN-DOOR MUSHROOM PRODUCTION FOR HIGHER INCOME



- In-door mushroom production in Thot Not district of Can Tho province;
- Investment cost for mushroom production house is 6,500 US\$/500m²

IN-DOOR AUTOMATIC CONTROL FOR MUSHROOM PRODUCTION IN CAN THO CITY



MUSHROOM PRODUCTION IN THE MEKONG RIVER DELTA, VIETNAM

- Vietnam is one of the 5 biggest mushroom producing countries in the world due to a plentiful materials of rice straw, saw dust, sugarcane, etc.
- Vietnam produces about 250,000 tons of mushroom per year with export value of US\$ 25-30 million, mainly from Eastern provinces and the Mekong river delta
- Average selling price of freshly harvested mushroom is US\$ 1.7/kg
- Export price of salted mushroom is US\$ 1,790/ton
- Average profit from out-door mushroom production in the Mekong river delta is about US\$ 0.5/m².cycle
- 20-30 million tons of rice straw produced annually in the Mekong river delta can produce about 2 million tons of mushroom with a total value of US\$ 1 billion.

PRESENTLY POPULAR MUSHROOM PRODUCING METHODS IN THE MEKONG RIVER DELTA

OUT-DOOR PRODUCTION

- *Advantage*
 - Lowest investment cost
- *Disadvantages*
 - Out of control of production conditions (temperature, moisture and pH)
 - Lowest yield
 - High harvest cost
 - Only one cycle in dry season per year
 - Annual changes of production sites

SEMI-IN-DOOR PRODUCTION (IN TREES PLANTATIONS OR WITH ROOFS)

- *Advantages*
 - Better control of production conditions compared to out-door production
 - Less labor cost in harvest
- *Disadvantage*
 - Annual changes of production sites

IN-DOOR PRODUCTION

- *Advantages*
 - The best control of production conditions with highest yield
 - Production year around (7-9 cycles/year with 35-40 days/cycle)
 - Less chemical application and higher mushroom quality
 - Lowest labor cost in harvest
 - No change of production site
 - The most efficient use of land for production
- *Disadvantage*
 - Highest investment cost

MUSHROOM PROCESSING IN THE MEKONG RIVER DELTA



Selling price of fresh mushroom: 50,000 – 55,000 VND/kg

Mushroom processing in Soc Trang province



COMPARISON BETWEEN OUT-DOOR AND IN-DOOR MUSHROOM PRODUCTION

Criteria for Comparison	Out-door production	In-door production
Initial investment cost (US\$)	0	7,500
Number of production cycles per year	1 - 2	8 - 9
Efficiency of rice straw use (kg of mushroom/100kg of rice straw)	13.85 – 16.15	9.86
Mushroom yield (kg of mushroom/meter)	0.7 – 0.9	1.67
Production cost (US\$/kg of mushroom)	0.8 – 1.0	1.4
Average selling price (US\$/kg of mushroom)	1.2 – 1.45	2.0
Profit (US\$/kg of mushroom)	0.35 – 0.50	0.75
Annual profit (US\$/1,000 meter.year)	900	9,850

CONSTRAINTS IN MUSHROOM PRODUCTION IN THE MEKONG RIVER DELTA

- **Mostly traditional production methods with low yield**
- **Low investment capital and production technology**
- **Weak production management & quality control**
- **Low processing technology & weak diversification**
- **Low efficient in technical training and extension**

DEVELOPMENT IN CASTLE PRODUCTION IN VIETNAM TOWARD 2020

PROVINCE/CITY	No. OF DAIRY COW/CASTLE BEFF AND MILK PRODUCTIVITY	
	2014	2020
Soc Trang	6,000 dairy cows at 2,174 farms with a total milk production of 26 tons of fresh milk/day	17,800 dairy cows
Ho Chi Minh City	100,000 dairy cows at small dairy farms	75,000 – 80,000 dairy cows at bigger farms
Hanoi City	13,000 dairy cows	20,000 dairy cows
Vietnam	200,000 dairy cows/ 550,000 tons of fresh milk/year 4,720,000 dairy cows 2,580,000 buffaloes	300,000 dairy cows/ > 0.9 mil. tons of fresh milk/year 12,000,000 castle beef 3,000,000 buffaloes.

(Source: Decision No. 984/QĐ-BNN-CN, dated 09/05/2014 by minister of Agriculture and Rural Development on “Approval of ‘reformation project of animal production towards an adding value increase and sustainable development”)

PRESENT CASTLE PRODUCTION IN SOUTH VIETNAM

Slicing machine for rice straw and grass



TMR mixer for grass, rice straw, cereal grains



Milking machine



A dairy farm in My Tu District of Soc Trang

RICE STRAW FOR CASTLE PRODUCTION IN TIEN GIANG PROVINCE



RICE STRAW USED AS ORGANIC FERTILIZER



Residues of rice straw from mushroom production treated with Trichoderma to apply to crops



Rice straw residues after mushroom production used as mulching materials or fertilizer for trees and crops in Lai Vung Dist., Dong Thap province

POPULAR USES OF RICE STRAW & ITS RESIDUES IN THE MEKONG RIVER DELTA

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graph TD; A[POPULAR USES OF RICE STRAW & ITS RESIDUES IN THE MEKONG RIVER DELTA] --> B[MUSHROOM AND FERTILIZER PRODUCTION]; A --> C[MULCHING MATERIALS]; A --> D[CASTLE FEED];
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MUSHROOM AND FERTILIZER PRODUCTION

- Mushroom
- Residues of rice straw after mushroom production used as fertilizer for crops

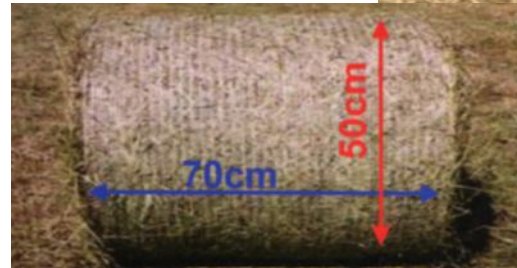
MULCHING MATERIALS

- For dragon trees, vegetables and other crops to keep moist, warm and to suppress weed

CASTLE FEED

- Main feed for buffaloes and beef castle
- Supplement feed for calves and cows

RICE STRAW BALERS IN THE MEKONG DELTA



JAPANESE BALER – Galan STAR

Capacity: 80 – 120 rolls/hr

- Capacity: 5 -7 hectares/shift;
- Weight of straw rolls: 15kg/roll



MODIFIED JAPANESE BALERS



Modified Japanese baler in Soc Trang province

HAI TINH RICE STRAW COLLECTING MACHINE IN THE MEKONG RIVER DELTA



TU SANG & PHAN TAN BALERS IN THE MEKONG RIVER DELTA



Tu Sang baler

Phan Tan baler



YANMAR COMBINED HARVESTER WITH STRAW CHOPPER



RICE STRAW COLLECTING DEVICES IN THE MEKONG RIVER DELTA



**Rice straw collecting device operating
in Tien Giang province:**



TRANSPORTATION OF RICE STRAW IN THE MEKONG RIVER DELTA

Transportation of straw
rolls by trucks in Soc trang
province: 215 rolls/truck



Transportation of bulk straw by
boats in Kien Giang province



Transportation of straw rolls by
boats in Dong Thap province



PART IV

RECOMMENDATIONS

**** Recommendations on uses of straw in the Mekong river delta***

- **Use up rice straw from rice production for different purposes to improve living standard of rice farmers and to reduce environmental pollution**
- **Utilize proper straw balers and transportation means for rice straw collection and transportation**
- **Use more rice straw for mushroom production, animal feed, mulching materials and fertilizer**
- **Diversify products processed from mushroom**
- **Study on use of rice straw for construction materials and handicraft products**

THANK YOU VERY MUCH FOR YOUR ATTENTION

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