Regional Workshop on Integrated Straw Management in Asia and the Pacific

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Crop Straw produced per year

- Sri Lanka- 2.5 MT

Straw distribution regions in Sri Lanka (Rice, maize etc.)

- Anuradhapura, Kurunegala, Polonnaruwa, Hambantota, Ampara, Monaragala, Badulla, Matale, Puttalam and Trincomalee districts

Crop straw management patterns

- Straw used as fertilizer

-Straw poorly utilized for fertilizer.

-crop straw left in field (15-20%) after harvesting is directly incorporated by ploughing.

-Only 5-10% straw recycled back to the field as compost manure or as decomposed material.

-Combine harvested paddy field, in-situ incorporation of straw using chopper, demonstrated in few fields since 3-4 years.

Crop straw management patterns contd..

- Straw used as fodder

Paddy straw and maize stalk also used as fodder crop for animals

- Straw used as industry material

In Sri Lanka 2-3 % of paddy straw used in paper industry (Jayasuriya, 1983).

* Weed management

-Application of rice straw mulch at the rate of 4t/ha was effective in weed management under DWSR (direct wet seeded rice) method.

-However, it was not very effective in weed management in the DDSR (direct dry seeded rice) method.

(D.A.U.D. Devasinghe, K.P. Premarathne and U.R. Sangakkara, Department of Plant Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka)

Potential of Converting Paddy Straw to Bio-char and Electricity in Sri Lanka (2014)

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Potential of Converting Paddy Straw to Bio-char and Electricity in Sri Lanka (2014) … cntd.

Total project costs and summary of financial evaluation

No	Description	Quantity	Unit
A	Cost of 2MW power plant and bio-char production	393.00	Mn LKR
B	Costs for 50 Units	19650.00	Mn LKR
C	Project development costs	3000.00	Mn LKR
D	Total project cost	22650.00	Mn LKR
		172.90	Mn USD*
1	Revenue 100MW at 0.8 plant generation capacity @ LKR 17.7/kWh	9724.86	Mn LKR
2	Annual loan repayment + Interest @14.5%	4427.37	Mn LKR
3	Depreciation over fifteen years	1359.00	Mn LKR
4	Operational costs of power plants @15% of annual revenue	1458.73	Mn LKR
5	Cash flow (item 1-(2+3+4)	2479.77	Mn LKR
6	Gross profit (item 1-4)	8266.13	Mn LKR
7	Net profit (item 1-2-4)	3838.77	Mn LKR
8	Payback period (total project costs/annual Net profit	6	years
9	Fixed IRR	35	%

Environmental cost calculation of urea production and application

No	Description	Quantity	Unit
1	Cost of production of urea	220.00	USD/tonne
		28.82	LKR/kg
2	Sale price of Urea	55000.00	LKR/tonne
3	Cost of Diesel	128.00	LKR/L
4	C_d	0.43	L/kg
5	ρ_d	0.83	kg/L
6	M_d	0.36	kg/kg
7	CV_d	16.02	MJ/kg
8	C_{cop}	0.23	L/kg
9	M_{cop}	0.19	
10	CV_{cop}	8.39	MJ/kg
11	E_{cop}	52.40	%
12	E_w	28.56	%
13	E_u	19.04	%
14	EC_p	3.43	billion LKR/year
15	EC_w	3.57	billion LKR/year

Conclusions

The commodity price energy equivalent technique based on diesel is a realistic approach to determine the environmental costs rather than depend on “willingness to pay”. Setting fire to straw is the highest environmental cost. It is just above fifty percent compared to similar environmental impacts of methane emissions and excess fertilizer applications. The bio-char application in combination with inorganic fertilizers for increasing crop productivity is the best solution for creating a surplus capital to develop the required knowledge base. Therefore, the economic benefits of converting straw to bio-char are substantial. The monetary value of fertilizer saving and reduction of environmental costs of one single year far exceeds investment for the proposed system. It provides rural electrification and diversification for increasing agriculture productions and processing of products. Further, it will be help to uplift the living standards of the rural community by reducing the environmental pollution due to present agronomic practices.

https://www.researchgate.net/figure/Total-project-costs-and-summary-of-financial-evaluation_tbl2_272158010

Straw burning problem

- Crop straw - Rice and Maize
- Main reason - Easy & quick method of disposal, Making fun
- Major negative impacts – 1. Polluting air
  2. Harmful to human health
  3. Loss of nutrients
  4. Damage soil micro organisms

Recommendations

* Maintain rain water level between seasons, so that straw degradation is faster

* Take precautionary actions to avoid the spread of random fires

* Increase the gap between seasons

Mechanization Proposals

Development of a straw chopper attachment for Combined Harvesters so that straw is chopped into small pieces before they are released to the field.

Thank you

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