

Producing “Eco-Paper” from Fast-Growing Warm- Season Grasses in China



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REAP-Canada

- A leading international agency dedicated to the development of ecological energy, fibre and food production systems
- A world leader with over 10 years in research and development of agricultural feedstocks for sustainable fibre production



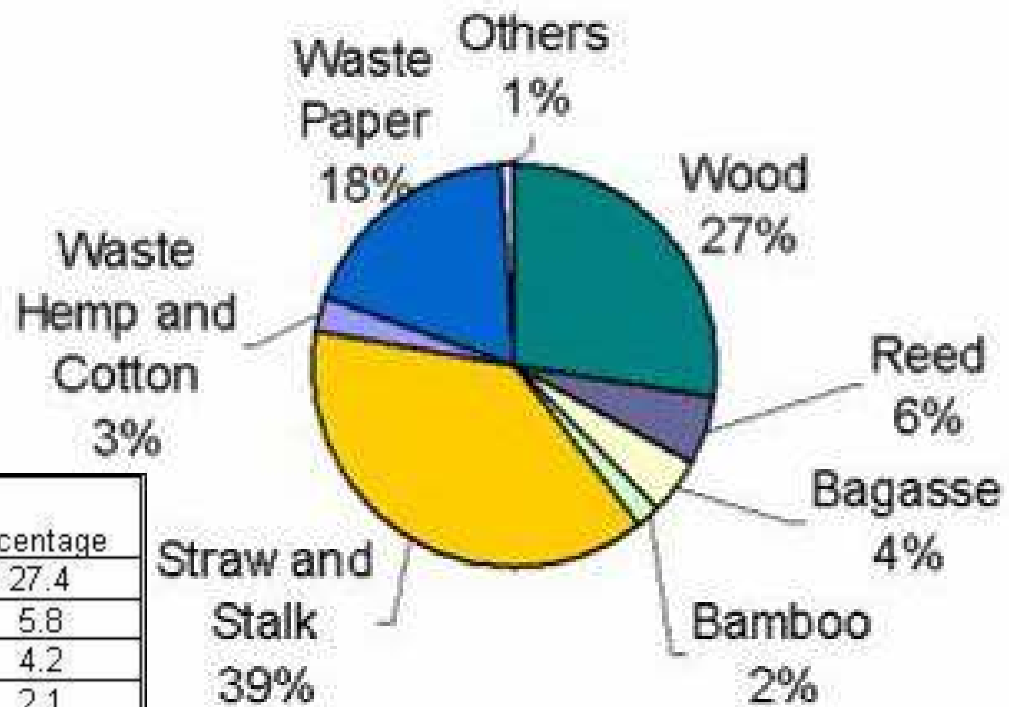
China's paper Industry

- **The largest non-wood fibre paper industry in the world**
- **One of the biggest polluting industries in China**
- **Need for modernization of the industry to reduce pollution and improve yield and quality of paper**



Fibre Sources of the Chinese Paper Industry

Breakdown of 55 Million Tonnes of Pulp Raw Material Consumed in China in 2000



Pulp Type	Consumption (million tons)	Percentage
Wood	15	27.4
Reed	3.15	5.8
Bagasse	2.3	4.2
Bamboo	1.17	2.1
Straw and Stalk	21	38.4
Waste Hemp and Cotton	1.5	2.7
Waste Paper	9.95	18.2
Others	0.65	1.2
Total	55	100

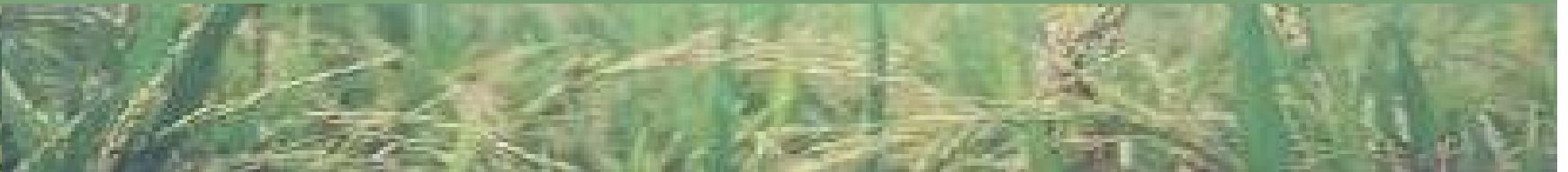
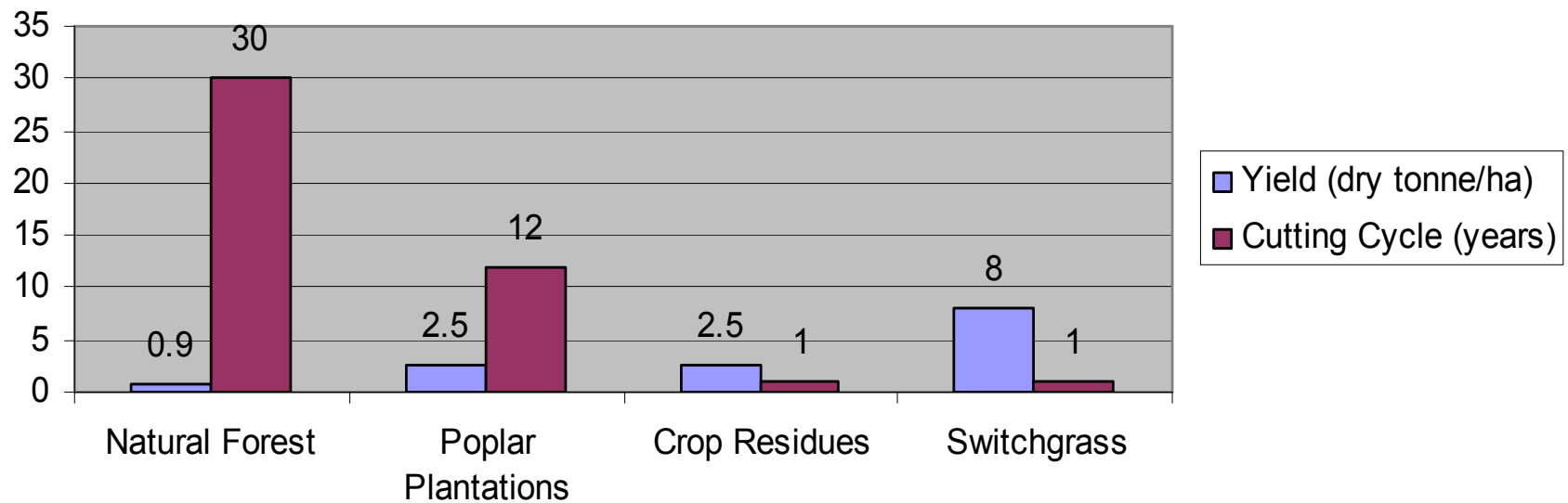
Fast-Growing Warm-Season Grasses: A New Fibre Opportunity

- Adapted to marginal soils and the warm summers and dry climate of central China
- Resource efficient plant with deep roots and low fertilizer requirements
- Can produce up to 10-12 tonnes/ha on quality sites but also adapted to marginal lands
- Excellent strategy to reduce the serious soil erosion problems of northern china

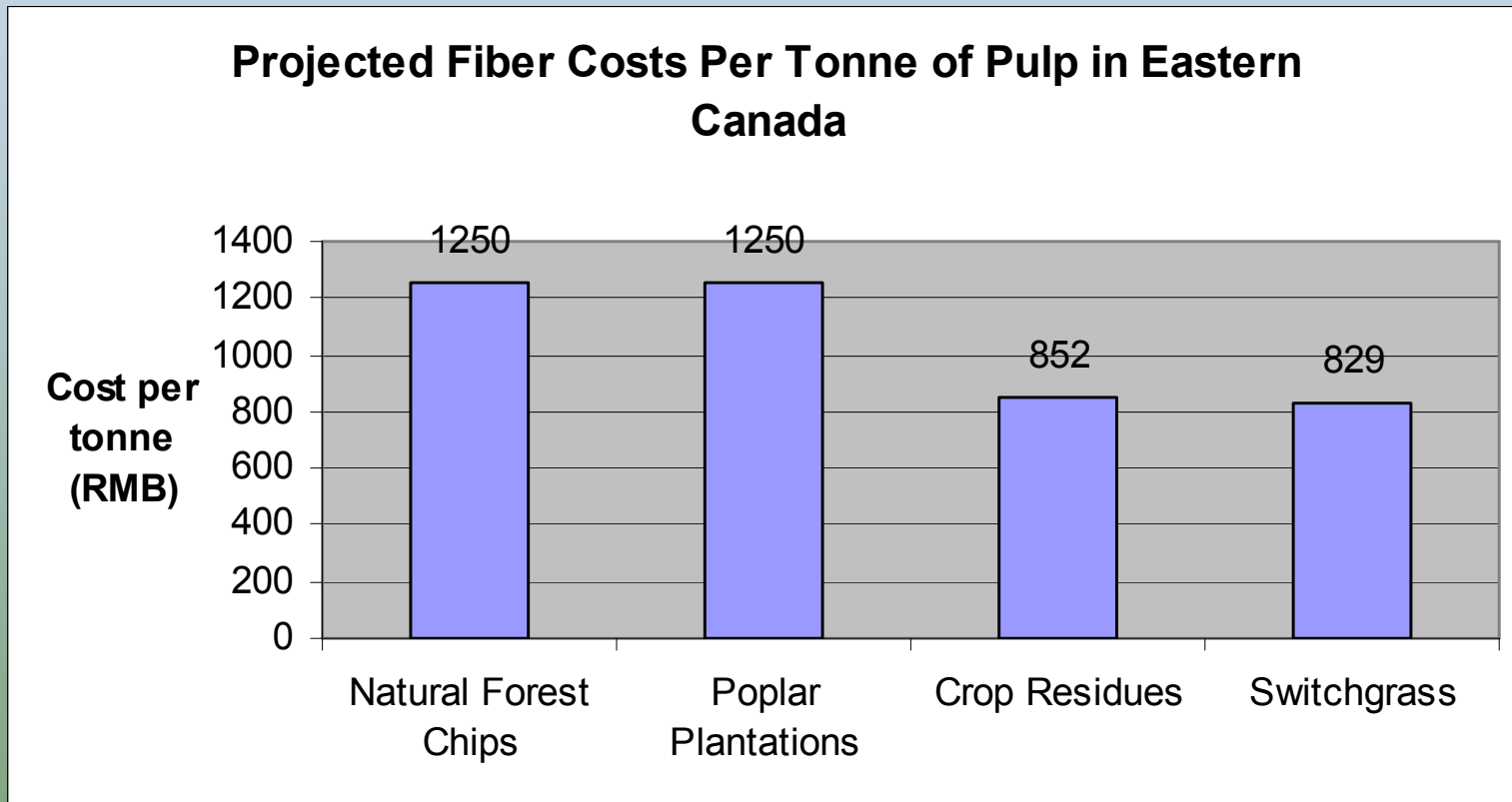


AVERAGE PRODUCTIVITY OF FIBRE SOURCES IN CENTRAL CANADA AND THEIR ASSOCIATED HARVEST CYCLES

Average Productivity of Fibre Sources and their Associated Harvest Cycles



PROJECTED FIBRE COSTS PER TONNE OF PULP IN CENTRAL CANADA



Fibre Attributes of Switchgrass for Paper Production

- Annual cutting cycle, stable production and consistent quality (slow to degrade) makes switchgrass an ideal fibre with low risks and rapid return on investment
- Pulp yields approximately 10% higher than cereal straws
- Ash content is typically less than 50% of cereal straws making recovery of pulping chemicals easier
- Higher pulp yields provide mills with lower handling and processing costs than cereal straws



Reducing Ash Content of Perennial Grasses

- Use warm season (C4) Crop species which use $\frac{1}{2}$ as much water as cool season (C3) species
- Over-wintering grasses can reduce Potassium by up to 90%
- Growing grasses on sandy soils can reduce silica levels
- Developing grasses with a high stem-to-leaf ratio

Plant Breeding For Fibre Improvement

- Significant advances in fibre yield and quality can be achieved through plant breeding
- REAP-Canada has developed several promising new varieties of switchgrass with improved production traits and quality



CONCLUSION

- **The Chinese paper industry can be modernized with the development of fast growing warm season grasses**
- **This will create a more environmentally friendly industry due to easing the chemical recovery of black liquors and minimizing soil erosion**
- **It will provide pulp and paper mills with a long-term, stable, and low-cost source of fibre to meet growing demands**

