

INNOVATIONS IN STRAW USE HIGHLIGHTED AT "STRAW TO GOLD" SYMPOSIUM '95

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NORTH AMERICA HAS AN ABUNDANCE OF AGRICULTURAL crop residues such as cereal straws and seed flax straw. Currently, most of that ends up being burned or plowed back into the fields. Canadian interest in developing value-added uses for crop residues has been increasing as a result of restrictions on burning, industry's realization that a "new" and significant fiber resource base exists in the Canadian Prairies, perceived consumer demand for environmentally friendly products, and to some extent income stabilization for farmers.

This Canadian interest in developing value-added uses for agricultural crop residues has resulted in two conferences last year: a one-day Alberta Agripulp Workshop held in Edmonton, AB, on June 1st, and more recently the "Straw to Gold" symposium held in Winnipeg, MB, October 23-26.

The Straw to Gold symposium was organized by the Crop Residue Network, represented by Alberta, British Columbia, Manitoba, Saskatchewan, and Canadian government departments. The symposium attracted representatives from farm groups, government departments, and industry including the energy, strawboard, pulp and paper, and food industries.

WHAPETON TOUR

The Straw to Gold symposium began early on the morning of October 23 when 120 hardy souls boarded three buses for a five hour trip to Whapeton, ND, the site of a new straw particleboard mill. There the group toured PrimeWood Inc., a producer of veneer raised panels, and PrimeBoard Inc., the straw board mill.

The PrimeBoard mill supplied by Daproma System

produces straw particleboard from wheat straw. At the time of the tour, it was producing 19-mm thickness board. The process starts from the wheat straw storage yard where large bales (4 x 4 x 8 ft. bales) are stored. The bales are brought into the straw preparation building where the straw is cut into 4- to 5-in. pieces using a tub grinder and then hammer-milled to 0.75- to 1-in.



*Stacking fresh straw
near Treherne in
Manitoba*

*Portable flax straw
decorticating system*





Dust and shive removal section at Treherne, Manitoba

pieces before being blown to the main building.

The straw is then dried and apparently screened into three fractions: fines which are directed to the surface layers, larger pieces which form the board core, and over-size pieces which are reprocessed and then directed back to the fractionating screen. Dust material is blown to the dust silo.

From the core and surface material silos, dry material is transported to two drum-type resin application blenders after which the glued particles are conveyed to a three-layer forming station which discharges the materials onto moving aluminum cauls. Spreader rolls are used to regulate material flow.

The 5 x 18 ft. mats pass over a weigh scale and are pre-pressed before entering a seven-opening hot press. At the press discharge, the cauls and boards are separated, with the cauls being conveyed back to the forming area on a parallel line and the boards being conveyed to a 20-wheel cooling line. After cooling, the boards are edge trimmed and sawn to size before sanding (the sanding unit was not operating) and manual inspection at the board inspection turner.

The capacity of the single line is 150 m³ per day based on a trimmed board size of 1530 x 5490 mm (5 x 18 ft.) at 19 mm (3/4 in.) thickness and a density of 650 kg/m³ (40.5 lb/ft³).

The PrimeBoard mill was still undergoing startup trials. Although no product specifications were provided, the straw board had an appearance more like MDF than particleboard due to the concentration of finer material on the surfaces.

KIMBERLY-CLARK TOUR

Another bus trip, at the end of the symposium, took 77 participants to Treherne in Manitoba to tour one of Kimberly-Clark's flax decortivating operations.

At Treherne, Kimberly-Clark maintains a flax straw storage depot. The straw is delivered in round bales weighing about 900 lb and tied with sisal twine. The

straw is stored in piles of about 20 tons each, spaced 600 feet apart to protect against fires. The straw is stored for one year before decortication.

During the tour, fresh straw was being piled. Some straw was being chopped in a mobile tub grinder, and blown onto the tops of the piles to protect the bales from weather damage. Bales of older straw were being retrieved from storage and delivered to the decortivating operation.

The mobile plant includes decortivating equipment, power supply, quality control facilities, and offices, all of which are mounted on flat bed trucks. It takes about 24 hours to set up or dismantle the plant.

The baled straw is delivered to a guillotine cutter from which it is conveyed to tub grinders. From the tub grinders, the bast fiber is sent to a baler, and the core material is blown into trucks for delivery back to the farm fields.

The entire operation at this flax storage facility is mechanized including pile stacking and retrieval, decortication, baling and core disposal. Some of the equipment used has been specially designed by Kimberly-Clark.

THE SYMPOSIUM

The two-day symposium drew about 250 registrants. Harry Siemens of Siemens Says Communications opened the formal sessions. A product showcase area included 25 displays from government agencies, suppliers of particle board plant equipment, pulp and paper technology suppliers, engineering and business consultants, suppliers of geosynthetic products, project developers, and a professional artist specializing in wheat straw weaving.

David Paul of Arisa Limited, Australia, provided a brief history of Australia's pulp fiber sources, and the conditions that have led to the present interest in non-wood fibers. Wheat straw is the prime contender; however, bagasse, cotton, kenaf and other nonwood fiber sources are also mentioned. Pulp produced in Italy using Australian straw has been found to have good characteristics, and plans are under way to build such a mill in Australia. Paul believes that nonwood pulping in Australia will grow significantly during the next decade.

Jane Teeter of the Food Bureau, Agriculture and Agri-Food Canada, presented "The Canadian perspective." She argued that Canada must move to make better use of its agricultural resources through value-added products. The technological resources for doing so are already pre-

sent and require only the initiative of producers and industry to promote development. Although there have been several Canadian success stories in such areas as pharmaceuticals, cosmetics, and ethanol fuel, she emphasized that Canada is falling behind other countries in making the best use of its agriculture.

RESOURCES

The afternoon session chaired by Ted Szabo of Alberta Industry and Development considered the cereal straw and flax straw resources available in the Canadian Prairies.

The first paper, "Western Canada's straw supply," was presented by Fred Kraft of the Prairie Farm Rehabilitation Administration (PFRA), Agriculture and Agri-Food Canada. Kraft suggested that non-traditional uses for straw are essential to adding value to agricultural products. Based on conservative estimates, he concluded that there are several prairie districts with an adequate straw supply to meet both traditional uses (i.e., feed and bedding) and new demands such as supplying nonwood fiber to the pulp industry.

Mark Stumborg of Agriculture Canada discussed "Crop residue export—issues and concerns." He said crop residues can be good for alternative uses if adequate measures are taken to ensure soil conservation and sustainability. Recent studies in the black soil zones in Saskatchewan have shown that with proper fertilization and minimum or zero-tillage systems, removal of crop residue had little or no impact on soil organic matter, which implies that significant amounts of crop residue could be made available to a wheat straw agri-pulp mill. However, the cost of transporting the residues over long distances would likely be the limiting factor in determining the size of the mill. Using crop residues would allow producers to earn a significantly higher profit margin on a given area of land.

The "Producer's perspective" was presented by Charles Fossay, a farmer from Starbuck, MB. He gave a history of what producers have traditionally done with straw in the past, and explained the various factors, primarily weather and crop demand, which influence the amount of straw produced from year to year. Many producers would welcome the sale of straw as an added income to their crop sales; however, buyers and producers must develop mutually beneficial supply contracts to account for yearly variations. Determining the price for straw also must be addressed, and should reflect its value to the buyer as well as being an incentive to the producer. Attractive prices could eventually lead to straw storage as a reserve against years of low straw supply.

Joseph Hogue, straw purchasing manager for Kimberly-Clark, talked about industrial opportunities using straw-based products. The presentation examined the global changes that have led to the current interest in enhancing farm earnings from the better use of straw. North American trade agreements in particular, and their

effect on Canadian agriculture were discussed. The current interest should lead to an expansion of agri-fiber businesses and industries. Examples given were textiles, pulp and paper, diesel and ethanol fuels, plastics, livestock, etc. The end result will be a greater incentive for farmers to take care of their straw supplies, and thus increase their farm income, Hogue said.

READY TECHNOLOGIES

The Wednesday morning session chaired by Paul Gebhardt, senior marketing officer, Saskatchewan Agriculture and Food, focused on technologies which currently are available for the commercial use of straw.

PAPRICAN's Paul Watson introduced the technical issues associated with the pulping and papermaking using nonwood fibers. By comparison with wood, nonwood materials such as wheat straw present significant processing challenges which can be overcome through careful consideration and innovation. Nonwood fibers can typically be used as a substitute for hardwood fibers in a range of paper products. A number of processes for pulping nonwood fibers, and their current state of development, were reviewed.

"Agri-boards: crop residue utilization in the building products industry" was the topic of the paper presented by David Plackett, manager composites and treated wood products, Forintek Canada Corp. He reviewed the processes that are being used, or could be used, to manufacture building materials and panels from nonwood fiber sources, primarily wheat straw, and the potential product markets. Several production facilities utilizing wheat straw are currently in operation in North America, and others are scheduled for startup in the near future. The presentation emphasizes that the primary considerations in using nonwood fibers for these applications are cost comparisons between the various raw materials available, and the high cost of transporting nonwood fiber over long distances.

CONCLUSION

There is a very strong interest in the Canadian Prairies to develop value-added products for the abundant crop residues which are available, raw materials which previously had been considered as a nuisance. Progress is being made rapidly in Canada and commercial ventures such as straw board mills will be a reality within the next year or two. Pulp and paper mills, which are more capital intensive, will require further planning. **TJ**

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Copies of the "Straw to Gold" symposium '95 proceedings can be obtained from Manitoba Agriculture at a cost of CAD 40. For more information, please contact Manitoba Agriculture, Box 1149, Carman, Manitoba, Canada R0G 0J0 [telephone: (204) 745-2040, fax: (204) 745-2299].