

Uses of Pinyon and Juniper

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Abstract—There is an overabundance of pinyon and juniper, especially in the Southwest. Finding value in these undesirable trees will help it pay its way off the land. This presentation provides information on potential uses of pinyon and juniper. The value of wood products made from these trees could range from \$10/ton to more than \$200/ton. Unfortunately the higher valued products, such as lumber and poles, might be impossible to produce from these trees, given their growth patterns. Methods such as cutting wood apart and putting it back together (for example, finger jointing, laminates) greatly increase the wood's value but at significant expense. Additional mastication can produce fibers useful for water pollution control and be the basis for composites. Composites can be made by blending various forms of wood (for example, dust, excelsior, chips) with recycled plastics or cement-based materials for a variety of products or rubbery material to make wheelchair accessible playgrounds. The advantages of keeping the wood round, if available in straight sections, could result in products such as guardrail posts or elaborate structures. Energy is the lowest valued use for wood; however, its demand exceeds supply so only economics limit the harvestable quantities. Considering the high cost of other forms of energy, the value of biomass markets could drive the value of the wood significantly higher. Given the importance of finding uses for pinyon and juniper, both expertise and some financing can be helpful.

Introduction

This paper is based on a power point presentation that provides information on the potential uses of pinyon and juniper wood. The presentation contains more than 100 photos and is available from the author. The following text briefly describes or discusses this power point presentation.

Market Value

- The market value of poles posts and lumber is generally more than \$200/ton.
- The market value of firewood, chips, and gasifier fuel is generally less than \$30/ton.
- The cost to harvest wood is greater than \$30/ton and transporting this wood adds \$0.20/ton/mile. Transportation costs can be reduced (as shown later) by processing, simply by increasing the density and removing water of a low value material (making pellets from chips), or by increasing the value by secondary manufacturing (making flooring from logs).
- Lower value material can be cut up and reassembled—finger-jointed studs, laminated beams, glulams, laminated veneer lumber. Even very crooked logs can be curve sawed making 1 by 1 material (still crooked) that can be laminated to make flat surfaces (similar to butcher block), which in turn can be cut into boards to make structural header I joists.

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Wood Fibers

Wood can be fiberized, essentially broken into fibers or fiber bundles (for example, larger than flour and smaller than chips). There are several outlets for this material when woven (more like snarled in a diaper machine that has a lot of barbed needles).

- Woven mats can be used as water filters. Depending on the pollutant, modification can be done to optimize pollutant absorption.
- Bulk fiber can also be loaded into flow-through screen baskets in parking lot drainage systems (among others).
- Seed can be incorporated into mats and used for erosion control or even hydroponics (astronauts grew vegetables in space using this technology).
- Spun plastic can be blended into mats and then hot pressed to form composite boards.

Wood Plastic Composites

Processes to make oriented strand board (OSB), particle board, and other hard boards require huge capital, and thus are only suitable when large sums of money are available. Alternatively, making wood plastic composites can be a small operation. In cooperation with a plastic manufacturer, such as one that manufactures back yard plastic chairs, recycled plastic can be blended with wood flour, which is much finer than fiber, and replace about half the plastic, making a potentially better product. This material is currently in use in many interior automotive components. Other products include decking, railing, window and door profiles, roofing, marine structures, siding, and fencing. Potential products include musical instruments, play centers, and shoes (clogs).

Low value high extractive wood, like juniper, can be suitably blended with plastic. There is a slight processing advantage (requires less lubricants) because of higher extractive content, some durability advantages, but the composite has a greater potential for color fade. With appropriate additives (pigments), the fade issue can be controlled, if that is important to the customer. A notable advantage of wood plastic signs is improved resistance to bullets. Accelerated weathering tests of wood plastic roofing shakes, which are very attractive, predict a 50-year life. The extruded decking market is growing fast.

Wood Cement Composites

Inorganic (cement-based) wood composites offer durable products. Examples include highway sound barriers, siding, roofing, and ceiling tiles.

Wood Rubber Composites

Flexible binders (latexes) can solidify wood chip playgrounds and trails enough to permit wheelchair access. There are still plenty of shock-absorbing capabilities. Cost is significantly less than rubber equivalents.

Animal Litter

Chips screened for ideal size can be used as a highly absorbent cat (and other creatures) litter. Superior to pellets that breakdown to (wet) dust, they reduce odor; and because there is no clumping the open spaces permit drying. The only problem is that under normal to light use, these chips appear to last forever.

Keep it Round

Cutting the largest rectangular shape from roundwood reduces its strength and stiffness considerably. The original roundwood is easily three times stiffer and might be as much as 10 times stiffer, depending on wood characteristics such as knots and taper. Reasons that rectangular shapes are weaker, in addition to having less wood, include the exposure of diving grain and juvenile wood. The variability of rectangular wood is considerably greater than round, so groupings of roundwood can have a higher classification. Uses for short irregular pieces include road barrier posts. However, depending on markets, slow-growing trees can be more valuable as lumber.

Structural Uses of Roundwood

Connectors, such as the dowel nut on 6-inch logs, can withstand as much as 40,000 lb before failing. Various arrangements (trusses, space frame) permit long spans, and buildings such as pavilions, bridges, and other structures have been built using roundwood. It is important to realize that building with roundwood is different, not necessarily harder. You need to see the various connections and/or work with an experienced user to decrease the growing pains. Fences, furniture, and erosion control structures (and fish cribs) are other uses.

Lower Cost Structures

A system of widely (32 inch) spaced studs and using only windows that fit between them eliminates the need for headers. Along with not attempting to show off the wood, roundwood can make economical dwellings. For an additional use for roundwood, exterior siding can be made from quartered logs. Residual wood from making siding can be used for nailers (large lath) for interior sheathing (drywall, paneling). Finally, sawdust can be used for insulation (important to treat and/or keep dry).

Energy

The lowest value for wood is energy. However, the market exceeds available wood supplies so it will always have an outlet.

Large-Scale Energy

St. Paul, Minnesota, has a 25 MW electric power generator (steam turbine) that burns urban wood wastes, collected from within 20 miles. This is an ideal size for this part of the country. To improve the economics, downtown St. Paul is heated with the low value steam (combined heat and power). Several other such plants are under construction or in planning stages. Somewhat larger plants would be possible but it is important to make sure the wood supply would be available on a continuous basis.

Small-Scale Energy

At the other extreme, Community Power Corporation in Littleton, Colorado, has a 5 KW generator (down draft gasifier) that burns wood pellets. Their larger units can burn a variety of feed stocks.

Processing and Transportation

There are a variety of wood processors from grinders to chippers with the associated advantages and disadvantages of each (for example, purchase costs, operations, maintenance). Depending on the processing, roll off containers could be the best transportation method.

Pellets

Because of the high cost of transportation, wood pellets become a better alternative because you then haul a less bulky, and less heavier biomass as well as removing much of the water. Considering the value of pellets (they are also easy to handle and burn cleanly), the cost of setting up a pelletizing plant could pay for itself in a relatively short period. This is especially true if the supply of wood is already dry, such as the waste wood from a secondary processing plant. Setting up a pelletizer in the woods for the sole purpose of selling pellets would take a considerably longer period to financially pay back. A new 2.5 ton/hour unit can be purchased for about \$300,000 plus the cost of a building. Pellet furnaces and boilers are becoming increasingly available in both small (home) and large (industrial) sizes.

Fuels for Schools

Today, schools and colleges have newer and more efficient heating systems and emit less pollution than those that use coal-burning systems. Examples include Chadron State College for 14 years, University of Idaho for 20+ years, and many other businesses in the wood products industry.

There are three options for handling this fuel:

Fully automated: suited to large facilities.

Surge Bin (smaller, simpler, less expensive, 2-5 day supply): suited for small facilities.

Pellet systems: fuel more costly; storage considerations, smaller sized, less expensive boiler and entire system.

Darby school costs for the winter of 2005/2006 were \$25,000, which included a \$5,000 test. Fuel oil would have cost \$115,000 so savings were \$90,000. Construction costs, which were greater than new construction because of retrofits and three new buildings, were about \$900,000. As fuel costs increase, the payback will likely be under 10 years.

Project Viability Factors

Community Enthusiasm and Support

Proximity to Biomass Fuel

Processing and Delivery Infrastructure

Fuel type/volume, Use Profile, and Unit Costs

Site Access and Space

Existing System Age, Condition, Adequacy

Construction and Integration Costs

Air Quality Permitting

Fuel Supply Considerations

Sources

Processing, Delivery and Storage—Clustering

Fuel Quality

Moisture Management

Ash—clinkers management

Chips versus pellets

The Good News

Using woody biomass will

- Reduce smoke from disposal burning
 - Human/Enviro Health—SOX, NOX, Green House Gas
 - Airshed Aesthetics—“Smokey Air”
 - Airshed space for Prescribed Burns
- Reduce cost to treat wooded land
- Save on heat and power bills
- Energy independence—Renewable
- Engage communities in solutions by creating jobs and small business opportunities

Finances

Hopefully, using pinyon and juniper will make economic sense. With a broader view of the cost and benefits to the environment, assistance (expertise and money) is available for demonstration projects or just to start projects.

Grants

- Federal, State, Foundations

USDA Rural Development

- Rural Economic Development Loans and Grants (REDLG)
- Community Facilities
- Rural Business Enterprise Grants (RBEG)

Carbon Trading

Municipal Leases

Fuel SAVINGS

Conclusions

Every effort should be made to turn the problems of excess pinyon and juniper into positive assets. Whether this means making valuable products out of it or developing methods to economically harvest it for energy, it is important that the work be done. Not only will this help the environment in ways, such as freeing up groundwater, but jobs will also be created.

Additional Information :

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