

Tanoak as a Forest Products Resource: *Past, Present, and Future*

Fifth Sudden Oak Death Science Symposium
Sheraton Sonoma County – Petaluma
June 22, 2012

John R. Shelly, CE Advisor

University of California Berkeley

Richmond Field Station, Richmond, CA

Stephen L. Quarles, Senior Scientist

Insurance Institute for Business & Home Safety

Tampa, FL

Tanoak – a species in search of an identity

<i>Also known as</i>	
Evergreen chestnut oak	<i>Pasania densiflora</i> (1866)
California chestnut oak	
Tanbark (or tan bark) oak	<i>Quercus densiflora</i> (1840)
Tanoak	<i>Lithocarpus densiflorus</i> (1917)

Lithocarpus – hard nut
(oak-like acorns)

densiflora – densely flowered
(chestnut-like flowers)

Tanoak ...

“...one of the most interesting inhabitants of the forests of the U.S..”

C. S. Sargent, Harvard University, 1895

“...seems no good reason why tanbark oak should not (provide for) all the purposes for which eastern hardwoods are imported.”

H. S. Betts, US Forest Service, 1911

“...aggressively takes control of sites after conifers have been removed in logging operations...considered a *WEED TREE* by timberland managers.”

C. L. Bolsinger, US Forest Service, 1988

Tanoak has Value as:

- Wildlife habitat
- Forest diversity
- Esthetic and societal principles
- Food source – wildlife and humans
- Wood products

Past Uses

Food – an excellent source of nutrients in Native American diets. The Hoopa tribe of Northern California preferred tanoak acorns over other native acorn sources *

Nutrient breakdown of leached tanoak acorns *	
Carbohydrate	55-69 percent
Fat	5-18 percent
Protein	3-6 percent

1 tree can provide 1 lb food per day for a year

* Food in California Indian Culture, 2004. Ira Jacknis (ed.)

Past Uses

Tannin – chemicals extracted from the bark used to process animal hides into leather (tanning).

Historic Annual Tanoak Bark Harvest	
1860*	3,600 tons
1880*	25,200 tons
1890*	28,800 tons (100 tanneries)
1950**	19,200 tons (5 tanneries)
1960	0

California Annual Production in early 1900's

- 250 million lbs of leather per year -- third in U.S. leather tanning
- Bark harvested from about 120,000 trees per year
- About 40 million board feet of wood left to decay per year
– a “stupendous annual waste”

* California Tanbark Oak, 1911. W. L. Jepson

**The Timberman, 1952

Past Uses

Firewood – high density hardwood makes excellent firewood

Lumber – Research in first half of 20th century indicated that high quality lumber with properties similar to eastern oak lumber could be produced*

Products Tested that performed well included:

- flooring
- heavy timbers (e.g. bolsters on logging trucks)
- truck beds**
- wagon parts
- furniture

Pulp for paper – short fiber, good for fine printing papers***

*Betts, H. S., US Forest Service, 1911

** Resch et al. UC Berkeley, 1963

*** Flinn, E. S., The Mead Corp., 1947

Tanoak Forest Products ?

- About 6% of tree volume (net) in the CA is Tanoak
 - Tanoak ~ 5 billion ft³
 - Other hardwoods ~ 18 billion ft³
 - Softwoods ~ 71 billion ft³
- More than 95% of hardwood lumber used in CA comes from other states or countries **
 - About 10 million cubic feet of hardwood lumber used in CA manufacturing each year
 - Less than ½ million cubic feet of tanoak lumber produced in CA each year

Net Volume on Forestland *

Species Group	Volume (million ft ³)
Softwoods	70,901
Oak forestland and rangeland	13,634
Tanoak	5,288
Madrone	3,200
Minor hardwoods alder, maple, cottonwood, ash, etc.	1,141
Other indigenous and exotic hardwoods	262

Is there a market for California Tanoak?

Sources:

* USDA Forest Service, 2008. PNW-GTR-763

** Shelly. 1997. USDA Forest Service PSW-GTR-160.

Properties

Property	Moisture Content	Tanoak*	N. Red Oak**
Density at 12% MC	12%	46 lbs/ft ³	44 lbs/ft ³
Bending Strength (MOR)	12%	17,400 psi	14,300 psi
Bending Stiffness (MOE)	12%	2.26 million psi	1.82 million psi
Hardness (side)	12%	1,450 lb	1,290 lb
Machinability***	8%	Very good	Very good
Ability to resist drying defects***	Green to 8%	Fair	Good
Tang. Shrinkage	Green to Oven Dry	11.7 %	8.6%
Radial Shrinkage	Green to Oven Dry	4.9%	4.0%

* Schniewind, UC Berkeley, 1960

** Wood Handbook, US Forest Products Laboratory

*** Based on the experience of the authors

Good Manufacturing

- **Understand the properties**

- Center dark colored core zone of many logs (mineral zone) cannot be dried without serious defects
- High initial moisture content and impermeable nature make kiln drying difficult. Common defects include kiln stain, cell collapse, and warp
- High shrinkage rates lead to warp problems

- **Follow best practices**

- Avoid the dark-colored core zone
- Quarter-sawn lumber minimizes shrinkage and warp problems
- Uniform stacking of lumber with top load restraint while drying minimizes warp
- Recommended drying schedule specifies rapid drying of fresh cut lumber surfaces at low temperatures below 80 F, followed by slow air drying to 30% MC, then kiln-drying to 8% MC.

Processing California Tanoak Logs into Lumber



High density western hardwoods can be used to make high-value products.



Tanoak Hardwood Flooring

Finding Unusual Opportunities

Spalted wood—early stage of decay—and insect tunnels create pleasant appearance or *character wood*



FUTURE MARKETS

- Commodity Lumber ??
- Niche Market – emphasize unique character for higher value products
 - Custom furniture, cabinets, and flooring
 - Custom flooring
 - Architectural design elements, millwork, etc.
 - Tool handles, crafts, gifts, picture frames, etc.
- Low Value Products
 - Firewood, fuel chips, mulch, compost, etc...

SUMMARY – Maximizing Value

- Understand quality manufacturing practices
- Understand risks of moving diseased or insect infested wood
- Lumber products must be properly dried
- For products, focus on local and niche markets ...emphasize “character”

For more information: <http://ucanr.org/sites/woodybiomass>