THE FORMOSAN SUBTERRANEAN TERMITE IN LOUISIANA

IMPLICATIONS FOR THE FOREST PRODUCTS INDUSTRY

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For over 30 years, the Formosan subterranean termite, *Coptotermes formosanus* Shiraki (hereafter referred to as the FST), has insidiously pillaged the structural underpinnings of the Greater New Orleans Metropolitan Area, damaging or even destroying historic structures, residences, and buildings (16). The FST is one of the most economically threatening insects in the world (1). Its aggressive nature makes it a formidable adversary in the fight to preserve a way of living in the Deep South, an area long known for a unique culture and architecture. Perhaps even more compelling is the FST's potential threat to future construction efforts in the coastal areas of the

South, particularly in the New Orleans area. Entomological experts have warned of impending disaster to potential homebuilders in the area if certain preventative actions are not taken. Louisiana's citizenry and government has begun to accept the need to address this issue before it is too late. Further delay could hamper management efforts.

Louisiana has a large, dynamic forest economy. In 1998, the primary manufacture of forest products (sawlogs and pulp) led to a gross farm value received of over $1.3 billion (20). Total value of forest products in the state for 1998 was nearly $5.4 billion. A considerable portion of this value comes from the harvest and production of lumber. In 1998, over 1.2 billion board feet of pine sawlogs were harvested, contributing over $1 billion of gross farm income to Louisiana's forest landowners. Much of this resource is used in Louisiana by the construction industry. Construction spending, which has been robust in metropolitan areas of south Louisiana for the past few years, depends to some degree on resources provided locally. Therefore, many forest products stakeholders such as landowners, primary producers, secondary producers, state government, local government, and homeowners are concerned about the FST's likely long-term impact, costs associated with managing the termite, and what policies may arise from this issue.

BACKGROUND

A native of China, Formosa, and Japan, it is suspected that the FST was introduced into the United States through ships sometime soon after World War II (21). Since FSTs were first discovered in a Texas shipyard in 1965, other colonies have been discovered in Louisiana, California, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Tennessee, and Hawaii (1,2). The FST was first discovered in Louisiana in the Lake Charles and New Orleans areas in 1966 (17).

The FST might be considered a "supertermite" by entomologists. An FST colony can reach over 10 million individuals, compared to 300,000 individuals for native termite colonies (21). They are aggressive foragers that will persistently test chemical barriers, seeking ways in which they can penetrate treated soil. Their nests are difficult to destroy, once established. Some treatment options include opening the walls and physically removing the nests, aerosol or foam applications of termiticides to walls, or whole-house fumigation. Dr. Gregg Henderson, an entomologist and FST expert with the Louisiana State University Agricultural Center, reports that FSTs swarm annually in April through July in southern Louisiana (21). Collection traps designed to catch alate (winged reproductive stage) FSTs have cataloged an over 2,000 percent increase in catch numbers from the period 1989 to 1998. It is estimated that the FST causes some $300 million in damage per year in the Greater New Orleans Metropolitan Area (23).

Despite these exponential increases in numbers, the FST is a weak flier and does not spread rapidly by itself. Instead, its more rapid means of dispersion is through transportation of products, such as lumber or landscaping timbers, from location to location (24).

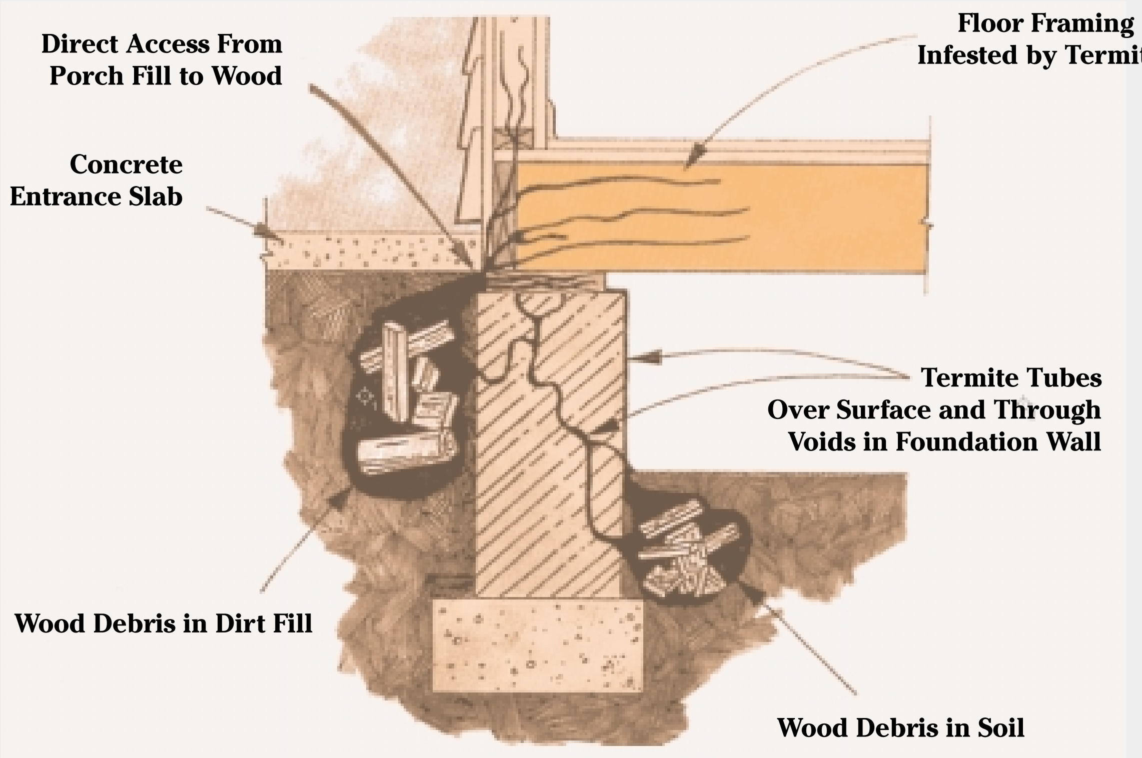
It has not been until recently that policymakers in Louisiana have taken note of the invasive FST. Now, at the behest of concerned constituents in south Louisiana and experts intimate with the FST situation, state government has responded.

Formosan subterranean termite damage can substantially jeopardize the structural integrity of wood beams in residential housing.

(Courtesy of Ed Bordes, New Orleans Mosquito and Pest Control Board.)

The Formosan subterranean termite can build tunnels from the ground to gain entry into houses.

(Courtesy of Ed Bordes, New Orleans Mosquito and Pest Control Board.)



How termite infestations occur in a structure. (Courtesy of Ed Bordes, New Orleans Mosquito and Pest Control Board.)

POLICY ACTIONS

In 1998, realizing the growing prominence of the FST situation in southern portions of Louisiana, Governor Foster formed the Formosan Termite Task Force, a collective of experts committed to determining the best course of action for Louisiana (7). One of the Task Force's first actions was to persuade the Louisiana legislature to pass legislation to deal with the FST dilemma. In the 1999 Louisiana legislative regular session, Paulette Irons of the Louisiana Senate sought and won passage of Senate Bill 373, which became Act 486 of the Louisiana legislature. The Act, enacted as Part IX of Chapter 20 of Title 3 of the Louisiana Revised Statutes of 1950, forms the Formosan Termite Initiative (FTI). With the FTI, the Louisiana legislature committed resources to the management of the FST, stating, "The legislature hereby finds and declares that the Formosan termite has for many years been a public nuisance, a pest, and a menace to homes and buildings, live trees, agricultural crops, electronic and communication cables, wooden bridges, railroad ties, pilings, and other structures." The legislature goes further by saying that the FST "must be contained and brought to a controllable level" (19).

The FTI created a Formosan Termite Initiative Project to be overseen and supervised by the Commissioner of the Louisiana Department of Agriculture and Forestry (19). The Commissioner was charged with consulting with an advisory group appointed by the executive or legislative branches of government regarding actions taken to curtail the spread of the FST; in addition, he was also granted authority to "adopt rules and regulations in accordance with the Administrative Procedure Act as he deems necessary to administer, enforce, and effectuate the provisions and purposes" of the FTI. Proposed rules created by the Commissioner are subject to oversight and review by the House and Senate committees on agriculture, the House Commerce Committee, and the Senate Commerce and Consumer Protection Committee. The FTI gives the Commissioner power to control the termite or to prevent the introduction or spread of the termite. Further, the Commissioner was granted the authority to enforce a quarantine of infested structures or regulated articles in any parishes (counties) or municipalities as he deems necessary, and may designate areas of the state as "Formosan termite suppression zones."

The Louisiana Department of Agriculture and Forestry then created a Formosan Wood Products Committee (26), which was charged with assisting in the creation of policies aimed toward controlling the pest, and with providing expertise and guidance to the Commissioner regarding possible ramifications of policy measures. The Formosan Wood Products Committee was established mainly through volunteers and the recruiting of participants. Moreover, any interested party has been allowed to join the full committee or a particular subcommittee. The full Formosan Wood Products Committee is subdivided into subcommittees as designated by the Louisiana Department of Agriculture and Forestry. The subcommittee designations and responsibilities originated with the full Formosan Wood Products Committee (18). The subcommittees were established to examine different aspects of the FST situation in Louisiana. The original charge of the subcommittees was to examine the feasibility and applicability of a possible requirement of the use of treated wood products in single-family residential construction. These subcommittees have raised and investigated numerous issues that are pertinent to each. Their activities to date are listed in Table 1. It has now been decided to expand the scope of the full committee and emphasize education and alternative treatments.

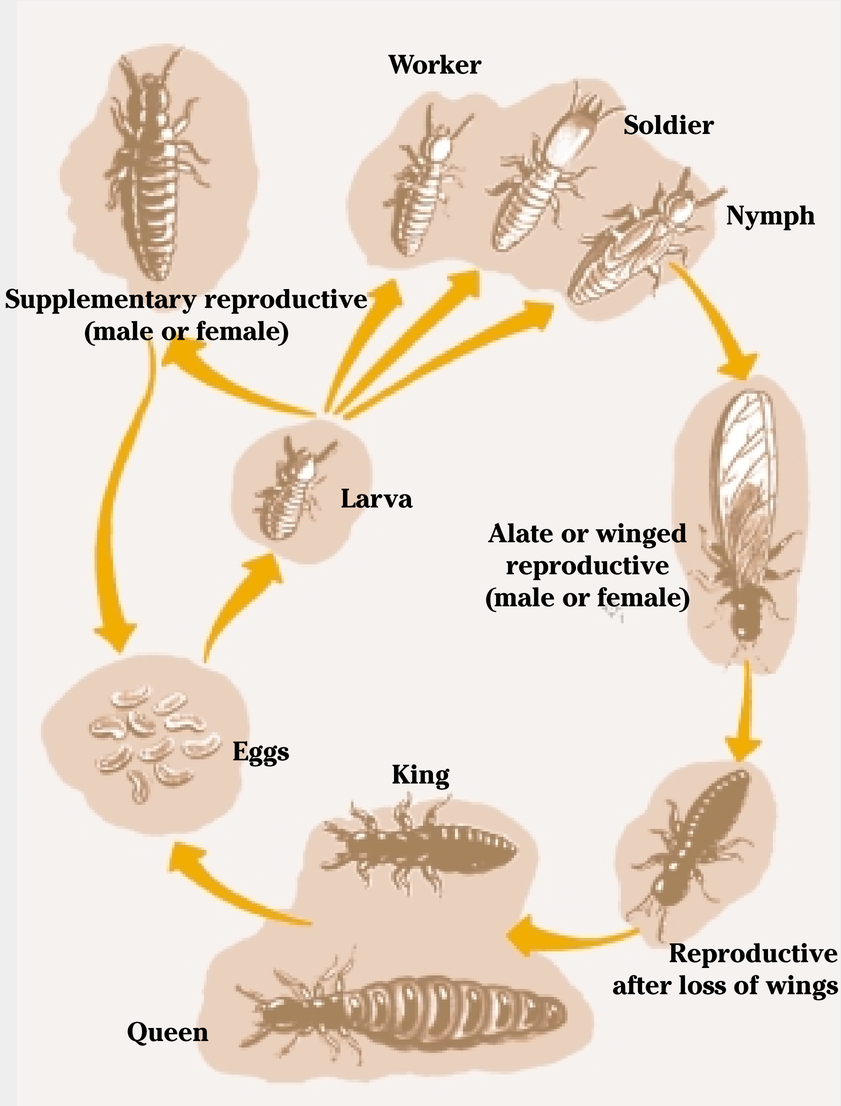
The subcommittees have made significant progress in examining a variety of economic, environmental, and technical issues and concerns. Work among the subcommittees will continue; however, their focus will now likely turn toward determining alternative treatment options. Educational and informational efforts will also be necessary to effectively combat the FST.

WOOD PRODUCTS ISSUES

The literature regarding wood preservative treatments and effects on the FST are sparse compared to that of other wood-destroying organisms. This is partly because of the fairly recent introduction of this species to the United States. Because of the severity of the problem, research has been conducted to identify appropriate preservatives to protect wood components against FST attack. The purpose of the wood preservative is to provide an "envelope" of protection for the wood component against wood-destroying organisms. Several preservatives have been used to accomplish this goal. The waterborne preservatives include ammoniacal copper zinc arsenate (ACZA), chromated copper arsenate type C (CCA), ammoniacal copper quat (ACQ) types B and D. Inorganic boron (disodium octaborate tetrahydrate (DOT)), and zinc borate (ZB) have been used against the FST. The oilborne chemicals that have been used include chlorothalonil (CTL), chlorpyrifos/iodopropynly butyl carbamate (IPBC), and copper naphthenate.

Oriented strandboard (OSB) cannot be successfully treated with a waterborne system due to problems associated with thickness swelling of the panels. However, OSB can be successfully treated with certain preservatives that are not water-based. Polyclear 2000 ™ from Osmose, Inc. is a clear, mineral spirits-based preservative for pressure treatment of engineered wood products. Another alternative for OSB is ZB applied in a powder form. U.S. Borax Inc. has a patent for this technology.

A key question at this time is what retention of a particular preservative is necessary to prevent FST attack? The American Wood-Preservers' Association (AWPA) has only recently begun to deal with this issue. Currently, AWPA does not state the appropriate level of borates that are



Termite life cycle. (Courtesy of Ed Bordes, New Orleans Mosquito and Pest Control Board.)

TABLE 1.

Formosan Wood Products Subcommittee responsibilities and current status of actions (as of February 29, 2000). [Note: the actions taken by the subcommittees, as reported here, were prior to the policymakers' change in scope to emphasize alternative methods for controlling the FST rather than possibly mandating wood treatment.]

Subcommittee Designation[a]	Responsibilities	Current Status
Rules and Regulations Working Group	Develop guidelines for the control of the FST. Guidelines should focus on halting the spread of the termite and should enhance consumers' confidence in using wood products as building materials. Guidelines should be cost effective to the consumer, manufacturer, and construction industry.	The committee is currently in the process of compiling the recommendations of the other subcommittees to use in preparing a final draft of possible guidelines. The recommendations will be submitted to the Commissioner of Agriculture and Forestry for consideration.
Engineered Wood Products Technology	Determine the engineered wood products that should be included in the building of structures to prevent FST invasion. Determine the availability of treated engineered wood products. Determine environmental or permitting constraints involved in adding plant production capacities.	The technology exists to treat all engineered wood products. Louisiana-Pacific Corp. will begin production of treated OSB in Silsbee, Tex., later in 2000. There is concern that termite grazing on an OSB web of an I-beam could compromise structural integrity. There is sparse research regarding treated engineered wood products, particularly regarding treated SYP OSB.
Environmental	Use science to answer environmental questions and concerns. Determine if there are individual health concerns associated with either the handling of treated wood products or for inhabitants of dwellings in which they are significantly enclosed by treated wood materials.	Most recent discussions:[b] 1) new or revised air permits will likely be required when building new kilns or adding capacity to existing kilns; 2) recycling or burning of sawdust will likely be discarded as an option in favor of landfill disposal; 3) burning of treated wood waste at the building site is environmentally unacceptable; 4) no data to suggest that handling treated wood products will result in elevated health risks to residential construction workers; and 5) no data furnished to indicate that occupants residing in homes constructed of treated wood products would incur increased risks from indoor air pollutants. Subcommittee recommends that the Louisiana Department of Agriculture and Forestry work with the Louisiana Department of Health and Human Services to identify potential health issues.

TABLE 1. CONTINUED

Subcommittee Designation[a]	Responsibilities	Current Status
Lumber Technology	Determine the lumber that should be included in the building of structures to prevent FST invasion. Also look at availability of treated and dried lumber. Determine environmental or permitting constraints involved in adding plant production capacities.	By July 2000, there will be sufficient production of kiln-dried after treatment (KDAT) lumber to satisfy any increase in demand for new residential housing, repairs, and remodeling in the Greater New Orleans area.[c] There is concern that heartwood on the surface of a board, seasoning checks, and improperly treated on-site cut-offs can provide a pathway for the FST.
Warranty	Prepare guidelines for a treated lumber and engineered wood products and labor warranty.	Recommendations for warranty:[d] 1) traceable, legible quality marks every 4 feet on products; 2) 10-year warranty for all preservative-treated wood building materials; 3) all warranties will be transferable for the minimum term; 4) warranty should cover replacement of failed preservative-treated materials and related labor costs not to exceed the cost of lumber; 5) AWPA or industry-recognized building code approval of qualified preservatives; 6) ALSC or APA or equivalent code-recognized certified-third-party inspection agency for products with building code reports (treated lumber and panels); 7) state-mandated and enforced framing inspection; 8) mandatory soil pre-treatment by a licensed pest control operator.
Economic Impact	Determine likely economic impacts associated with any possible guidelines surrounding FST efforts.	Subcommittee has compared prices for untreated versus treated lumber framing material[e]. Using 2,031 ft.^{2} for a standard residence, the subcommittee estimates a 21% increase in framing lumber costs for raised dwellings, with the untreated framing package costing approximately $16,094 on average and the treated package costing approximately $19,511 on average. For slab dwellings, the subcommittee estimates a 31% increase in framing lumber costs, with the untreated framing package costing approximately $9,784 on average and the treated package costing approximately $12,821 on average.

[a] Subcommittee designations as provided by the Louisiana Department of Agriculture in an electronic mailing to Formosan Wood Products Committee members dated September 3, 1999.

[b] Environmental Subcommittee report, January 20, 2000.

[c] Lumber Technology Subcommittee report, November 18, 1999.

[d] Warranty Subcommittee report, January 20, 2000.

[e] Economic Impact Subcommittee report, 1999. Exact date unknown.

effective against FST attack (15). AWPA Standard P18 was adopted in 1999 and states that ZB may be used as an additive during the manufacture of wood composites. The standard states that composites treated with ZB are not suitable for ground contact and must be protected with a water-resistant coating when used in exterior applications (3). AWPA Standard P-5 lists several approved waterborne preservatives, including inorganic boron (4).

Policymakers in Louisiana have carefully examined the FST situation in Hawaii. The city and county of Honolulu passed Ordinance 97-16 and Bill 43(1996)CD2, FD1, which require that all structural lumber of new residential buildings and additions shall be treated (10). Other regulations require the perimeter and foundation to be termite resistant. Research has shown that under conditions of high termite hazard, wood treatment to retention levels greater than 1 percent DOT can be expected to provide protection from serious structural damage, although minor feeding may still occur. Treatment to higher retention can be expected to progressively minimize the possibility of minor cosmetic damage, but cosmetic damage has been reported even at a high retention (11,14). Copper naphthenate (13) and CCA type C and ACQ type D (25) have been shown to give adequate protection against the FST. Moreover, research results have shown that naturally durable woods such as Alaska-cedar (*Chamaecyparis nootkatensis* D. Don Spach), redwood (*Sequoia sempervirens* D. Don L.), and teak (*Tectona grandis* L.F.) compare favorably in termite resistance to preservative-treated wood (12). These results also indicate that the heartwood extractives of Alaska-cedar and redwood are toxic to termites. In addition to redwood and Alaska-cedar, there are some other North American native species that may merit consideration for this purpose.

THE FST SITUATION IN LOUISIANA MAY EVENTUALLY HAVE IMPLICATIONS FOR THE ENGINEERED WOOD INDUSTRY THROUGHOUT NORTH AMERICA. AS MORE STATES TRY TO DEAL WITH THE SPREAD OF THE FST, MORE HOMEBUYERS AND HOMEBUILDERS IN IMPACTED AREAS MAY TURN TO TREATED WOOD.

The literature regarding the success of inorganic borates in deterring FSTs is not in total agreement. Preston et al. (25) reported results using CCA type C, DOT, ACQ type D, a proprietary insecticide, and untreated controls in a 12-month field study conducted in Hilo, Hawaii, using unincised Douglas-fir interior (*Pseudotsuga menziesii* Mirb. Franco) structural lumber. Their results showed that the DOT treatment was subject to attack at all retention levels tested and the non-linear regression analysis of the data predicted an equivalent protection threshold retention in excess of 1.5 pcf (24.0 kg/m^3), that is some 13 times higher than the retention requirement of CCA type C. Another study showed that Douglas-fir samples treated with 25 percent and 30 percent boric acid equivalent (BAE) solutions of sodium octaborate and held for an 8-week diffusion period were subject to severe degradation from termite attack (6).

Southern yellow pine lumber (SYP) is widely used with many different preservative treatments because of its high permeability and ease of treatment. However, the heartwood of SYP lumber is much more difficult to treat than the sapwood. The "envelope of protection" of SYP lumber, plywood, LVL, glulams, and I-beams could be compromised if the wood contains appreciable amounts of heartwood. Similarly, seasoning checks and end-cuts of lumber that are improperly field-treated can provide a pathway for the FST.

The FST situation in Louisiana may eventually have implications for the engineered wood industry throughout North America. As more states try to deal with the spread of the FST, more homebuyers and homebuilders in impacted areas may turn to treated wood for the many different products used in building construction. It is known that CCA is an effective preservative for engineered wood products such as plywood, laminated veneer lumber, laminated lumber, and I-beams (fabricated with a combination of lumber and plywood). However, most of the American forest products industry has little experience with producing treated OSB. In fact, there currently is little treated OSB production in the United States. The former MacMillan Bloedel (now a part of Weyerhaeuser) has sold OSB treated with Borogard® ZB, a derivative of zinc oxide and borax (hydrated sodium borate). It is applied as a dry powder and does not require the use of organic solvents and has minimal environmental impact (22). Louisiana-Pacific Corporation has announced plans to convert its OSB plant in Silsbee, Tex., to the production of treated SYP OSB in 2000 under the product name of SmartGuard™ (27). Although standards are currently lacking for borate-treated engineered wood products, they may be forthcoming in future AWPA standards.

Treated OSB production in the southern United States will likely utilize a high percentage of SYP. Many plants will probably exclusively use SYP as the furnish for their treated OSB production. There are few research reports in the public domain that have investigated properties of treated SYP OSB. Another critical issue for borate-treated OSB is the possible effect on I-beams that are manufactured with OSB in the web. Most studies show that borates allow a small amount of termite grazing. This grazing, even though it is minimal and cosmetic, can possibly be severe enough to compromise the structural integrity of I-beams because they are manufactured to extremely small tolerance levels. Since borates are water-soluble, a concern also exists regarding the use of borate-treated OSB for housing construction; panels are exposed on the job site and there is the possibility of leaching and a decrease in decay resistance.

Treated OSB has been successfully produced in Canada using aspen (*Populus* spp.). SYP has inherently different properties than aspen and presents different challenges and opportunities for the industry and researchers. For example, public domain research investigating critical properties such as bonding are lacking. In addition, there are no studies on long-term decay resistance and creep of treated SYP OSB.

There are some environmental concerns associated with using treated wood in residential housing. The advance of inorganic borate products into the marketplace may alleviate some of the concerns that have centered around workers' handling and exposure to treated wood. Budy and Rashad (9) found a significant increase in the cancer death rate for carpenters when compared against the general population. However, they were unable to attribute this to exposure to arsenate-treated wood because the excessive cancer death rate remained at consistent levels both before the introduction of arsenate-treated wood and during a period of substantial exposure to arsenate-treated wood. Another study found acceptable air quality in rooms built with Wolmanized® wood (29). Many of the concerns regarding toxicity of treated wood in a house fire are well addressed in a report by United States Testing Company, Inc. (28). Other environmental concerns related to the manufacture and disposal of treated wood should be resolved if manufacturers work with appropriate state and federal environmental agencies. Many of the environmental and other problems of treated wood can be avoided if one follows the Environmental Protection Agency (EPA) approved Consumer Information Sheet (5).

Concluding Remarks

The climate in Louisiana is detrimental to all housing. In addition to the FST, occasional hurricanes, high rainfall, and high temperatures all combine to the benefit of most wood-destroying organisms. In order for homeowners to receive the best possible protection, they should follow integrated pest management (IPM) practices: 1) proper building practices (below-slab steel mesh products, proper on-site waste disposal, and rain water management around the house); and 2) treatments and inspection (periodic inspection of the house and trees, and the use of soil termiticides). In addition, a comprehensive, public education outreach program is necessary to educate current and potential homeowners regarding IPM practices and proper home maintenance, and to inform lending agencies and insurance companies of the perils of failing to follow IPM practices. If a homeowner adds treated wood to their IPM program, they are adding another link in their chain of protection against the FST and other wood-destroying organisms.

Research and outreach to address some of the concerns raised in this paper are in progress. For example, soon a typical home may include a termite detector (8) as a standard item, similar to smoke and carbon monoxide detectors.

The FST is an aggressive insect that feeds on cellulose and causes significant damage where it exists. The businesses and families of New Orleans' French Quarter can attest to its devastating appetite. Serious consideration of this issue by the state is beneficial to all affected parties. Actions have been initiated in order to quell this growing threat. The Commissioner of the Louisiana Department of Agriculture and Forestry has repeatedly emphasized his commitment to control the termite's spread and devastation, while at the same time insuring the health and prosperity of the forest products industry, a vital component of Louisiana's economy.

LITERATURE CITED

1. Agricultural Research Service. 2000. A National Formosan Subterranean Termite Program. http://www.ars.usda.gov/is/AR/archive/oct98/form1098.htm.

2. __________ 2000. ARS Formosan Termite Infestation Maps. http://www.ars.usda.gov/is/fullstop/infestationmaps.htm.

3. American Wood Preservers' Association. 1999. American Wood-Preservers' Association Standards 1999. P18-99. Nonpressure preservatives. AWPA, Granbury, Tex.

4. __________ 1999. American Wood-Preservers' Association Standards 1999. P5-99. Waterborne preservatives. AWPA, Granbury, Tex.

5. American Wood Preservers Institute. 2000. http//www.awpi.org.

6. Archer, K.J., D.A. Fowlie, A.F. Preston, and P.J. Walcheski. 1991. A termite field test with diffusion treated lumber. 22nd annual meeting of the Inter. Res. Group on Wood Preservation. Working Group III. Preservatives and Methods of Treatment. Kyoto, Japan. IRG Secretariat, Stockholm, Sweden.

7. Associated Press. 2000. Builders hit roof over Odom's plan for termite-proofing. The Advocate, Capital City Press. January 24, 2000. Page 6B. Baton Rouge, La.

8. Borgen, R. 1999. Termite detection system on its way to your home. Louisiana Agriculture 42(1):7.

9. Budy, A.M. and M.N. Rashad. 1976. Cancer mortality among carpenters in Hawaii. *In*: DePCA Proceeedings.

10. City and County of Honolulu. 1996. Ordinance 97-16, Bill 42 (1996), CD2, FD1. Honolulu, Hawaii.

11. Grace, J.K. and R.T. Yamamoto 1994. Repeated exposure of borate-treated Douglas-fir lumber to Formosan subterranean termites in an accelerated field test. Forest Prod. J. 44(1):65-67.

12. __________ and __________ 1994. Natural resistance of Alaska-cedar, redwood, and teak to Formosan subterranean termites. Forest Prod. J. 44(3):41-45.

13. __________, __________, and P.E. Laks. 1993. Evaluation of the termite resistance of wood pressure treated with copper naphthenate. Forest Prod. J. 43(11/12):72-76.

14. __________, __________, and M. Tamashiro. 1992. Resistance of borate-treated Douglas-fir to the Formosan subterranean termite. Forest Prod. J. 42(2):61-65.

15. Hall, J. 2000. Oral presentation to Commissioner of Agriculture and Forestry Formosan termite committee. February 17, 2000. Baton Rouge, La.

16. Henderson, G. and C. Dunaway. 1999. Keeping Formosan termites away from underground telephone lines. Louisiana Agriculture 42(1):5-7.

17. Koehler, P.G., N.Y. Su, and R.H. Schreffrahn. 1991. The Formosan subterranean termite. Florida Cooperative Extension Service, Institute of Food and Agricultural Sci., Univ. of Florida Fact Sheet 216. http://edis.ifas.ufl.edu/BODY_MG064. 7 pp.

18. Louisiana Department of Agriculture and Forestry. 1999. Electronic memo to members of the Louisiana Formosan Program for Wood Structures. September 3, 1999. Baton Rouge, La. 16 pp.

19. Louisiana Legislature. 1999. Act 486, the Formosan Termite Initiative. Louisiana Revised Statutes of 1950, Part IX of Chapter 20 of Title 3, §§ 3391.1 - 3391.13. Baton Rouge, La. 12 pp.

20. Louisiana State University Agricultural Center. 1999. 1998 Louisiana Summary of Agriculture & Natural Resources. Pub. 2382. Louisiana State University Agricultural Center, Baton Rouge, La. 318 pp.

21. __________. 2000. Formosan Subterranean Termite Web Site, http://www.agctr.lsu.edu/wwwac/termites/.

22. MacMillan Bloedel. 1999. Bug-Brake™ borate-treated oriented strand board. http://www.mb-osb.com/mbosb.bug-brake/index.html.

23. McClain, R. 1999. Builders oppose termite proposal. The Advocate. November 20, 1999. Page 1a. Baton Rouge, La.

24. Oi, F.M. and T.G. Shelton. 1997. Formosan Subterranean Termites. Alabama Cooperative Extension System IPM Alabama Homepage. http://www.aces.edu/department/ipm/formoterm.htm.

25. Preston, A.F., L. Jin, and K.J. Archer. 1996. Testing treated wood for protection against termite attack in buildings. American Wood-Preservers' Assoc. Proc. AWPA, Granbury, Tex. pp. 205-220.

26. Southern Forest Products Association. 1999. Formosan termite defense supplies eyed. Southern Forest Products Association Newsletter, December 6, 1999. 1 pp.

27. The Piney Woods Journal. 1999. La-Pacific adds protection treatment against Formosan termites at Silsbee plant. December. The Piney Woods Journal, Dodson, La.

28. United States Testing Co., Inc. 1984. Report to Koppers Co., Inc. dated Nov. 20, 1984. Number 05050. Koppers Co., Inc., Pittsburgh, Pa.

29. Williams, D.R. no year given. Evaluation of Wolmanized® treated wood for interior use (abstract). Koppers Co., Inc., Pittsburgh, Pa.

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