An Assessment of the Impacts of a Domestic Phytosanitary Treatment Regulation for Wood Packaging Material Manufacturers

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Abstract

The results of a mail survey undertaken in mid-2008 to determine the response of wood packaging material (WPM) manufacturers to a universal treatment requirement, similar to ISPM 15 ''Guidelines for Regulating Wood Packaging Material in International Trade,'' are described. Reactions to a universal requirement were positive (nearly 60% in favor), with larger companies tending to be more positive. Less than 9 percent of respondents indicated they would cease WPM manufacturing. Impacts on pallet pricing were most prevalent at or in excess of $1.00 per unit, with nearly two-thirds of respondents indicating that their customers would accept the true cost of treatment. While only 36 percent would like to see the universal requirement implemented sooner rather than later, these companies were heavily involved in custom heat-treating services and are therefore anticipating the associated marketplace opportunities. The accompanying capital investment in new or additional heat-treating equipment would benefit equipment manufacturers. As the process to create and implement a universal treatment requirement in the United States evolves, policymakers should take into account the current state of the economy, and the WPM industry in particular, and how a change of this magnitude would impact the businesses comprising this industry sector.

The monetary costs resulting from the introduction of nonindigenous species of plants and animals have been estimated to be almost US$120 billion a year in the United States (Pimentel et al. 2005). One of the more well-known forest pests in the hardwood region of the United States is the gypsy moth (*Lymantria dispar*). After its introduction in Massachusetts in the late 1860s, the gypsy moth has since spread through most of northeastern North America (Liebhold et al. 1992). Monetary costs associated with gypsy moth control have been estimated to be approximately $211 million annually (Pimentel et al. 2005). Recently, other exotic pest species have been introduced and threaten the hardwood resource. The emerald ash borer (EAB; *Agrilus planipennis*) is just one of these new threats. First discovered in 2002 in Michigan (Cappaert et al. 2005), this pest species has spread to Illinois, Indiana, Ohio, Maryland, Missouri, Pennsylvania, Virginia, West Virginia, and Wisconsin. The EAB is a serious threat to the ash resource throughout North America (Cappaert et al. 2005).

Increased globalization of trade has increased the threat of new introductions of exotic pests (Haack and Cavey 1997). Wood can be a refuge for these pest species and thus aid in their introductions. Between 1985 and 1996, 5,885 interceptions of exotic insects on wood articles were made at port locations in the United States (Haack and Cavey 1997). Regulatory steps have been made to try to reduce the introduction of harmful pests into the United States. One of these steps is the phytosanitary treatment of wood

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Forest Prod. J. 60(4):309–314.

packaging material (WPM) with the passing of ISPM 15 ''Guidelines for Regulating Wood Packaging Material in International Trade'' by the International Plant Protection Convention in March 2002 (IPPC 2002). Since then, many countries have adopted and begun enforcing ISPM 15. The United States became fully compliant in July 2006 with full enforcement by Customs and Border Protection.

With the continuing threat of invasive species, a number of new issues have moved to the forefront. These issues concern broader treatment requirements for WPM in the United States and Canada. First, the bilateral agreement between the United States and Canada, allowing untreated WPM made from native wood species to move between the countries, will be coming to an end. Canada has implemented a phased-in enforcement approach for WPM entering Canada from the United States. The four-phase Canadian program will span 32 months. Following the implementation of the phased approach in Canada, the United States will submit a similar proposed rule in the *Federal Register*. Currently no action has been taken by the United States.

Second, the serious situation surrounding the spread of the EAB in the United States has been an ongoing concern for the Animal and Plant Health Inspection Service (APHIS), resulting in serious consideration of a domestic ISPM 15 treatment for all WPM originating in and moving to destinations in the United States. In the event of a domestic treatment requirement, questions and concerns are raised for all parties involved in the manufacture, transport, and use of WPM. Manufacturers are concerned about bottom-line economic issues such as increased cost of WPM, capital outlays for more heat-treating equipment, higher costs resulting from increased energy consumption, and maintenance of markets and customers. End users of WPM may find it beneficial to explore more cost-effective substitutes. While plastic may seem to be an easy substitution, volatility in oil prices may not favor this alternative. A more likely alternative may be packaging manufactured from wood fiber and engineered wood products, which are exempt from treatment requirements under ISPM 15.

Currently, it is not entirely clear how domestic enforcement requirements would be met. Nor is it clear whether the two approved treatments under ISPM 15 (heat treatment and methyl bromide fumigation) will both be available for domestic treatment or whether additional treatments may be considered. On August 27, 2009, APHIS published an Advance Notice of Proposed Rulemaking in the *Federal Register* and requested comments regarding regulatory options for wood packaging material used in domestic commerce (US Department of Agriculture–APHIS [USDA-APHIS] 2009). This represents the initiation of the full process to develop and implement a universal domestic treatment requirement for WPM.

As a result, it can be easily argued that the impacts of a domestic treatment requirement on WPM producers should be investigated. In 2002, industrial products (pallets, containers, railway ties) represented more than 40 percent of the hardwood resource consumed annually in the United States (Luppold and Bumgardner 2008). The WPM industry produces over 400 million new pallets annually (Bush and Araman 2009). A recent industry publication found that the price tag for enacting such legislation could top US$1 billion and could detrimentally impact many WPM producers (Anonymous 2009). In order to gain a better understanding on how WPM manufacturers would respond to a domestic treatment requirement, the Appalachian Hardwood Center (AHC) conducted a survey to determine their position with regard to this potential change in legislation.

Methods

A questionnaire was developed to elicit perceptions, concerns, and attitudes of WPM manufactures regarding domestic treatment of WPM. The survey instrument was developed with the assistance of two representatives from USDA-APHIS and three WPM manufacturers. The survey was then pretested with four WPM manufacturers. Feedback from the pilot study was used to develop the final survey instrument.

The target population for this research project was all US WPM manufacturers using hardwoods. The study population comprised a list of wood products businesses that had previously been identified as WPM manufacturers and had received communications from the AHC within the last 3 years and were deemed to be legitimate, active addresses. This list was originally developed through a variety of sources including industry directories, State Division of Forestry offices, State Development offices, and trade associations. The final mailing list contained 1,771 WPM manufacturers from 33 states constituting the hardwood region of the United States.

The survey contained 15 questions related to business operations, production, and WPM treatment. General operation and production questions included whether they still manufactured WPM, their annual production, level of exports, employment, and zip code of their primary operation. The remaining questions were related to the potential for domestic WPM treatment. These included general questions on manufacturers' thoughts about a domestic treatment regulation, how this might impact their business, whether they had existing treatment capacity to handle more WPM, and costs associated with such a regulation.

The questionnaire was mailed on July 10, 2008, and a reminder postcard was sent on July 31, 2008.

Because returned forms were anonymous (except for zip code), it was not possible to complete a second survey mailing to WPM manufactures who didn't respond. Summary statistics were performed on survey responses. Likewise, chi-square tests for independence and Spearman's rank correlations were used to determine if relationships existed among responses to survey questions. Yates continuity correction was used for those cases in which cell sizes were below five observations.

Results

Response rate and demographics

A total of 481 survey instruments were returned as undeliverable, leaving 1,290 businesses. Two hundred sixteen responses were received, yielding an adjusted response rate of 16.7 percent. Forty-eight of the responses indicated that the company was not currently manufacturing WPM, and five of the responses were unuseable for analysis purposes because they were not filled out appropriately. One hundred sixty-three useable responses were available from WPM manufacturers. Because of the low response rate and

the nature of the subject matter, there was potential for nonresponse bias. This bias could not be estimated because surveys were not traceable to the companies responding. The anonymity of respondents was very important because of the sensitivity of the subject matter. We feel that the response rate would have been much lower if respondents could have been identified through the survey method.

The following results are a compilation of the 163 useable responses (overall useable response rate of 12.6%). Many of these responses contained instances in which some of the survey questions were unanswered. Therefore, all results will be reported with the number of useable responses.

Responses were returned by companies from 20 different states (Table 1). Company size was gathered from respondents in order to assess differences in responses based on facility size. Current average employment among the 160 respondents was 31.7 employees. The majority of responding manufacturers had fewer than 25 employees (Table 2). About 75 percent of respondents' production of WPM was destined for domestic use, with the remainder destined for international uses. Pallet production represented 84.2 percent of respondent production, with other types of WPM such as crating, packing blocks, drum cases, load boards, pallet collars, skids, and dunnage representing the remaining 15.8 pecent.

With respect to their sources of information on phytosanitary measures, 59 respondents relied on the National Wooden Pallet and Container Association, while 51 relied on their inspection agency.

*Table 1.—Geographic distribution of respondents to a survey on domestic treatment of wood packaging material (*n *= 150; no response = 13).*

State	Respondent frequency	No. sent	% response
OH	25	244	10.2
PA	20	123	16.3
NY	17	106	16.0
VA	11	52	21.2
WI	9	50	18.0
KY, IN	8	159	5.0
IA	7	34	20.5
MA, GA	6	110	5.4
SC, WV	5	65	7.7
MD, IL, LA	4	106	3.8
AL, OK	3	88	3.4
AR	2	49	4.1
NH, MN	1	46	2.2

*Table 2.—Reported number of employees by respondents to a survey on domestic WPM treatment (*n *= 160, no response = 3).*

No. of employees by size categories	Frequency
0–25	104
26–50	26
51–75	15
76–100	8
101–150	2
151–200	3
200+	2

Response to domestic treatment

The primary purpose of the survey was to gauge how businesses would react to a universal phytosanitary treatment requirement for WPM. First, respondents were asked if they believed the USDA-APHIS proposal to establish a National Regulation on Domestic Wood Packaging Materials, which would essentially treat all WPM whether for domestic interstate or international use under the ISPM 15 system, is a worthy endeavor. A majority of the 151 respondents (no response = 12) were supportive of a universal heat treatment requirement (89 of 151, 58.9%). Sixty-two respondents did not consider the proposed action to be worthy (41.1%). This response differed according to business size. Those that thought it was a good endeavor tended to be larger firms, while conversely, smaller firms felt that it was not a good solution ($\chi^2 = 9.64$, $P = 0.002$). Firm size was categorized as $\leq$15 employees and $>$15 employees to differentiate between small and large WPM manufacturers.

Respondents were also asked if they would continue manufacturing WPM under a universal treatment requirement. Overwhelmingly, 91.6 percent (142 of 155; no response = 13) indicated they would continue manufacturing WPM. Only 13 (8.4%) indicated that they would cease manufacturing WPM.

Also, respondents were asked to comment on their most likely business response to any federally mandated requirement to treat all WPM. Answers were grouped based on similarities in response. Seventy-nine indicated that they would simply comply with the new requirements, 14 indicated they would buy heat-treating equipment, 13 indicated they would raise prices, 12 reported they would possibly quit the business, 6 said they would do nothing, 3 stated they would buy heat-treated lumber, and one would out-source phytosanitary treatment.

Pricing WPM under a universal treating requirement

WPM manufacturers will be faced with the prospect of increasing their product prices to cover the additional cost of universal treatment. The question becomes, how will their customers react to higher WPM prices? Respondents were asked specifically how much cost would be added to a pallet under the universal treatment for both heat treatment and methyl bromide fumigation. Table 3 summarizes the additional cost results.

*Table 3.—The additional cost per pallet anticipated by survey respondents under a universal treatment requirement, for both heat treatment (*n *= 153) and methyl bromide treatment (*n *= 68).*

Additional cost per pallet ($)	Frequency of response, no. (%)	
	Heat treatment	Methyl bromide treatment
0	3 (2.0)	6 (8.8)
0.01–0.50	2 (1.3)	1 (1.5)
0.51–1.00	53 (34.6)	11 (16.2)
1.01–1.50	46 (30.1)	18 (26.5)
1.51–2.00	28 (18.3)	8 (11.8)
>2.00	21 (13.7)	24 (35.2)
Total	153 (100.0)	68 (100.0)

A price increase in excess of US$1.00 per pallet was the most prevalent response in both cases, 62.1 percent for heat treatment and 73.5 percent for methyl bromide fumigation. Analysis of high (>US$1.00 per pallet) and low (≤US$1.00 per pallet) cost estimates for methyl bromide fumigation showed no relationship ($\chi^2 = 3.53$, $P = 0.060$) with whether or not the respondent thought a universal treatment was a worthy endeavor. The same analysis for heat treatment was significant ($\chi^2 = 4.42$, $P = 0.0356$). For those that thought universal treatment was not a good idea, a surprising number thought there would be a high cost to satisfy treatment requirements. On the other hand, an unexpected number of respondents who thought a universal treatment would be good, thought there would be a low cost to satisfy treatment requirements.

The survey respondents were asked to estimate the percentage of their customers that would accept the true cost of treatment. Overall, they estimated that 65.7 percent of their customers would accept the true additional cost. Responses to this question were categorized so that general trends could be investigated. Sixty-four of the 142 respondents felt that more than 80 percent of their customers would accept the true additional cost of treatment (Table 4).

As the percentage of customers estimated to accept the true cost of a universal heat treatment increased, the additional cost per pallet needed to satisfy the new requirement decreased ($r = -0.29$, $P = 0.0004$). There was no significant correlation for methyl bromide fumigation ($r = 0.011$, $P = 0.92$). Furthermore, those that thought treatment was a good endeavor were significantly more likely to also think customers would accept the true cost of treatment, while conversely, those that thought treatment was not worthwhile also believed that fewer of their customers would accept the true cost of treatment ($\chi^2 = 34.99$, $P < 0.0001$).

Acceptance, or lack thereof, of higher costs for universal treatment can be tied, at least in part, to the traditionally higher cost of available alternative packaging material. Responding WPM manufacturers were no doubt well aware of the magnitude of price increase that will lead to substitution with alternative products. Eighty-seven (55.1%) of 158 respondents indicated that they believed a universal treatment requirement would lead to price increases high enough to allow alternative packaging materials to capture a larger proportion of WPM markets, which is closely aligned with the percentage of respondents estimating price increases per pallet in excess of US$1.00. Seventy-one respondents (44.9%) did not believe that accompanying price increases would favor alternative packaging materials. The most identified alternative material was plastic (62 responses), followed by fiber/corrugated/cardboard (29 responses), engineered wood (9 responses), steel (1 response), and anything that is cost effective (1 response). No relationship was found between responses to the question whether additional costs to treat WPM would be enough to allow alternative packaging materials more market share and the costs of treatment for heat treating ($\chi^2 = 3.6$, $P = 0.06$) or methyl bromide ($\chi^2 = 0.09$, $P = 0.75$). We did find that for those that felt treatment was not a good endeavor, significantly fewer of their customers than expected would accept the true cost of treatment. Conversely those believing a universal standard was a good idea responded that more of their customers would accept the true cost of treatment ($\chi^2 = 15.22$, $P < 0.0001$).

Table 4.—Frequency of acceptance of the true additional treating cost with a universal treatment requirement of WPM, as estimated by survey respondents (n = 142, no response = 21).

Level of acceptance of increased cost by WPM customers (%)	Frequency of response, no. (%)
0	10 (7.0)
1–20	16 (11.3)
21–40	8 (5.6)
41–60	27 (19.0)
61–80	17 (12.0)
81–99	17 (12.0)
100	47 (33.1)

Capital investment issues

The other major cost involved in moving to a universal treatment requirement is the additional capital investment required for those heat-treating WPM to secure sufficient capacity to meet the requirement. Among respondents, 83 (60.6%) of 137 did not have sufficient heat-treating capacity to meet universal requirements, while 54 (39.4%) reported currently having sufficient capacity. Respondents that thought a universal treatment was not worthy did not have sufficient capacity, while those that thought it a worthy endeavor reported sufficient capacity ($\chi^2 = 20.94$, $P < 0.0001$).

Of the 83 respondents with insufficient capacity, 48 (58.5%) indicated that they would make the capital investment to achieve the necessary capacity, 34 (41.5%) indicated they would not make the investment, and one respondent did not answer the question. When respondents felt that less than 50 percent of their customers would accept the true cost of treatment, more respondents than expected would not invest to achieve sufficient treatment capacity. When estimating that more than 50 percent of their customers would accept the true cost, more respondents than expected would invest in sufficient capacity ($\chi^2 = 28.75$, $P < 0.0001$).

Since the survey did not specifically inquire how companies would handle insufficient capacity, it is not clear how these manufacturers would deal with the circumstance. The obvious choices are to engage the services of a custom heat treater, reduce overall production to meet current heat-treating capacity, or purchase heat-treated lumber and fabricate WPM without the need of on-site treatment capability.

Custom heat treating

Custom heat-treating services allow WPM manufacturers to diversify and expand their business activities. Eighty-four (53.2%) of 158 respondents were currently providing custom heat-treating services, while 74 (46.8%) were not. Those providing heat-treating services averaged 10.4 customers, with a range of 1 to 70 customers. Table 5 shows the distribution of custom heat-treating services, as a percentage of their heat-treating capacity.

With a universal treatment requirement, WPM manufacturers will find themselves using existing heat-treating capacity to satisfy their in-house needs, thereby reducing capacity available for custom treating. Forty-four (54.3%) of 81 respondents indicated that they would add additional

Table 5.—Distribution of custom heat-treating services, as a percentage of heat-treating capacity (n = 80).

Level of custom heat treating (%)	Frequency of response, no. (%)
1–20	51 (63.8)
21–40	8 (10.0)
41–60	4 (5.0)
61–80	7 (8.7)
81–99	6 (7.5)
100	4 (5.0)

heat-treating capacity to maintain current levels of custom heat treatment, while 37 (45.7%) indicated they would not. For the 42 (2 nonresponses occurred among the 44 indicating they would add capacity to meet current custom treatment levels) adding heat treatment capacity, 39 (92.9%) indicated they would also be adding additional heat-treating equipment to increase custom heat-treating service capabilities over current levels.

For those respondents that said less than 50 percent of their customers would accept the true cost of heat treatment, more than expected did not have sufficient heat-treating capacity. Conversely, those indicating that more than 50 percent of their customers would accept the true cost of heat treatment, more than expected have sufficient capacity ($\chi^2 = 16.14$, $P < 0.0001$).

Similarly, those utilizing custom heat-treating services may be impacted by a universal treatment requirement for WPM. Fifty-nine (37.8%) of 156 respondents reported using custom heat-treating services. Of these 59 responses, 53 indicated their view about whether their custom heat treater will be able to service their needs with a universal treatment requirement. Twenty (37.7%) believed that their custom heat treater would be able to fulfill their needs, while 33 (62.3%) did not.

In addition, these WPM manufacturers were asked if they would add heat-treating capacity if a universal treatment requirement is implemented. Twenty-seven (50.9%) of 53 (6 of the 59 using custom heat-treating services did not respond) thought that they would add heat-treating capacity, with 26 (49.1%) indicating they would not. Furthermore, for those that thought universal treatment was not a good endeavor, more than expected would not add their own heat-treating equipment, while those believing it was a good endeavor, more than expected would add heat-treating capacity ($\chi^2 = 6.62$, $P = 0.01$).

Timing of a universal treatment requirement

There are two distinct perspectives on how soon WPM manufacturers would like to see implementation of a universal treatment requirement. First, there are those who see implementation as an opportunity to expand their business activities by providing custom heat-treating services. The second perspective is a negative view of additional regulation of their businesses and the additional burdens this creates.

To further investigate these perspectives, respondents were asked if they prefer the implementation of a universal treating requirement to occur as soon as possible. Fifty-six (35.9%) of 156 responding indicated that they would prefer the implementation occur sooner, with 100 (64.1%) saying they prefer later implementation. Interestingly, 38 (67.9%) of the 56 responding favorably were businesses providing custom heat-treating services. That is, the opportunities for custom heat-treating services will increase in this transformed marketplace. Statistically, the relationship between universal treatment and how soon it should occur was significant ($\chi^2 = 53.6$, $P < 0.0001$). Overwhelmingly, those that thought a universal treatment requirement was not a good endeavor also did not want implementation to occur as soon as possible; whereas, those that wanted it to occur as soon as possible thought is was a good endeavor.

Discussion

Perhaps the most important inference of this survey is that the WPM industry is a resilient one. Less than 9 percent indicated that they would stop manufacturing WPM with this proposed new wave of regulations. While many businesses seemed weary of the continued regulation of their industry, there was a significant core of businesses that recognized the opportunities available with increased regulations. This was particularly true of those interested in providing custom heat-treating services, as evidenced by their desire to see implementation of a universal heat treatment requirement sooner rather than later. However, there was inherent concern over having to increase WPM prices and the ability to maintain a customer base in a competitive environment.

The statistical results served to confirm that those believing that a universal treatment requirement is a worthy endeavor were more positive in their responses. Overall, this group believed their customers would be more likely to accept the true cost of treatment, they tended to estimate lower costs to produce compliant pallets, they did not believe that substitutes would gain market share over WPM, they reported sufficient heat treatment capacity to handle the universal treatment requirement, they were more likely to invest in additional treatment capacity, and those currently providing custom heat treating had sufficient capacity to handle the new universal requirement. Those that thought it was a good endeavor overwhelmingly thought that implementation of the universal treatment requirement should occur as soon as possible, further supporting the notion that these folks see this as an opportunity.

The results also imply that there may be additional opportunities to provide custom heat-treating services. Among those currently utilizing custom heat-treating services, 62.3 percent believed their current treater will not be able to fulfill their needs; only 54.5 percent of custom heat treaters were anticipating adding treatment capacity; and only 49.1 percent of those using custom heat treating will add in-house capacity.

Allied industries will also see significant changes in their business activities. Heat treatment manufacturers will see enhanced demand for their products. Similarly, the various inspection agencies will see a spike in business in the form of new customers and increased activity from existing customers.

The other impact to WPM manufacturers will certainly be an increased number of employees because many businesses will experience increased workloads for the treatment of WPM. The larger companies are most likely to be the major source of increased employment because they were most receptive to a universal treatment requirement. Smaller companies view a universal treatment requirement as a large obstacle that will impact their potential for survival,

whereas larger companies see it as an opportunity with which additional capital investment can lead to further economies of scale and larger market share.

The universal treatment requirement will no doubt have a greater impact on the industry than the initial ISPM 15 requirements for international movement of pallets. This is because a larger proportion of WPM being manufactured in the United States is for domestic use only and does not currently require treatment. Based on responses to a question about domestic production versus production for export, about 75 percent of production was for domestic use, meaning that the impact will be roughly three times greater on the industry than was the impact of requirements for international trade. With overall production of pallets being 84.2 percent among respondents, pallets, as opposed to the other types of WPM such as crating, packing blocks, drums cases, load bards, pallet collars, skids, and dunnage, will bear the brunt of the impact.

A significant number of respondents (55.1%) envision the possibility of alternative materials capturing market share with the added cost of a universal treatment requirement. The inference from the survey data is that the high proportion of expected price increases in excess of US$1.00 per pallet will be the most important driver for increased competitiveness of alternative packaging materials. This is comparable to estimates recently published that found heat treating on site costs US$0.75 per pallet versus double that cost for those that have to be shipped to a third party for treatment (Anonymous 2009).

However, based on discussions with Industrial Reporting Inc., there is no evidence that substitution of alternative packaging material occurred to any great extent with the implementation of ISPM 15 for WPM in international trade (McBee 2008). It is likely that the same scenario will play out with a domestic heat treatment requirement and the reaction by respondents to the possibility of significant substitution of alternative products may be attributed to an initial overreaction to a new set of government regulations on their businesses that they only recently became aware of.

As the move to a universal treatment progresses through the *Federal Register* process of proposed regulations and comment, the industry should be proactive as individual businesses, as well as encourage those organizations they rely on for information about phytosanitary measures to be responsive in the process and represent their interests.

Finally, as the regulatory process unfolds, policymakers should remain acutely aware that any change of this magnitude during a period of weakness in the economy and weakness in the financial markets could be devastating to a WPM industry that must undertake a significant shift in the way it does business.

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