Research Reports

Market Demands and Characteristic Preferences for Pine Straw in Alabama[1]

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Abstract

Pine straw is a popular landscape mulch material used by landowners and homeowners throughout the southeastern United States. Pine straw is collected, transported, and sold through an informal network of landowners, harvesters, forest labor contractors, and dealers. Quality varies widely, depending on factors such as species of pines, land management practices, and harvesting techniques. A mail survey of landscapers, retailers, and lawn maintenance specialists was used to assess market demand and characteristic preferences of those buying and selling pine straw in Alabama. Purchase volumes varied widely among buyers, both annually and for single-time purchases. Buyers placed high importance on straw free from weeds and foreign material. There were differences in species of pine straw purchased among respondents, some of which appear attributable to location of the buyer. While there was a strong preference for longleaf pine straw, those who reported purchasing loblolly and slash were more likely to prefer those species. Responses from buyers who know their pine straw's origin reveal differences in the distance from which they purchase pine straw, with many buying straw from more than 150 miles away. Results also show that many do not know where their pine straw comes from or what species it is.

Index words: mulch, *Pinus* spp., landscaping, pine straw.

Significance to the Nursery Industry

Over the past several decades there has been an increase in demand for pine straw harvested from Southern pine forests for use as ground cover in managed landscapes. Pine straw as a mulch provides many benefits and is a source of short-term income for forestland owners. The market is better developed in some states than others. Little research has been done to understand what characteristics buyers are looking for and what land management practices landowners can implement to better meet market demands. Results from a 2010 mail survey of landscapers, retailers, lawn maintenance specialists, and others show that many buyers do not know what kind of straw they are buying or where it comes from. However, those respondents that are more aware expressed a preference for longleaf pine straw and often purchase pine straw from more than 150 miles away. Despite expressed preference for species with longer needles, respondents prioritized cleanliness of straw over needle length. Survey results can be used to raise awareness among buyers of variability in pine straw quality and help landowners determine which land management practices, such as use of herbicides, may make their product more marketable.

[1]Received for publication November 2, 2011; in revised form December 12, 2011.

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The *Journal of Environmental Horticulture* (ISSN 0738-2898) is published quarterly in March, June, September, and December by the Horticultural Research Institute, 1200 G Street NW, Suite 800, Washington, DC 20005. Subscription rate is $75.00 per year for scientists, educators and ANLA members; $120.00 per year for libraries and all others; add $25.00 for international (including Canada and Mexico) orders. Periodical postage paid at Washington, DC, and at additional mailing offices. POSTMASTER: Send address changes to Journal of Environmental Horticulture, 1200 G Street NW, Suite 800, Washington, DC 20005.

Introduction

A byproduct of a natural biological process, pine straw is considered a non-timber forest product (NTFP) and is used as mulch in landscapes throughout the United States, in particular the Southeast. Aside from being decorative, pine straw provides many benefits, which is why it has become a valuable commodity among landscapers across the country. Pine needles interlock and stay in place while protecting against surface erosion, moderating soil temperature and moisture, and inhibiting growth of weeds (14). Pine straw reduces runoff and, because it reduces the impact of rain on the soil surface, it protects against compaction (16). In addition, pine straw has the potential to provide forestland owners with short-term income while allowing timber to remain standing until time to thin or when the stand reaches full rotation.

The cost of pine straw compares favorably to other mulches, including pine bark, cypress, cedar, red mulch, and pine nuggets (17). A feasibility study conducted by Glacierland Resource Conservation and Development (RC&D) in Wisconsin examined consumer preferences for various mulches, including pine straw, pine bark, wheat straw, recycled paper pellets, and recycled paper crumble. Of the various mulches presented, respondents ranked pine straw second behind pine bark as the preferred mulch, both following an initial application and six weeks later (13).

In 2000 the University of Georgia Center for Agribusiness and Economic Development began to collect data for pine straw as a separate commodity as part of its annual farm gate value report for the state. In 2000, pine straw was valued at $15,563,253 and accounted for 2.1 percent of the forest products market (6). Boatright and McKissick (2) estimate that in 2009, pine straw contributed more than $81 million to Georgia's economy (up 420.5 percent from the 2000 commodity figures), and accounted for more than 16 percent of the forest products market. The top pine straw producing county in Georgia (Laurens County) harvested straw from about 55,000 acres at an average per-acre value of $125, totaling $6,875,000 for 2009 (2).

In Alabama it is difficult to estimate pine straw harvests — yields are not reported. Alabama ranks number two in the country in terms of the percent of forestland owned by non-industrial private landowners — second only to Georgia (1). In 1995, Alabama ranked third in the area of pine plantations on private land, but is expected to surpass Florida and become second by 2040 (18). Yet despite the high potential for pine straw production in the state's many pine plantations, the market is not well developed.

For reasons both economic and legal, the pine straw industry is an informal network of dealers, forest labor contractors, harvesters, and landowners that operate in a fairly limited geographic region (4). Pine straw raking is often done by crews of workers from Mexico and Central America recruited by forest labor contractors through the H2B guest worker program (9). Many fledgling pine straw operations fold within a year (4). Pine straw harvesting occurs on privately-owned land and access is largely unregulated. Ecological concerns, such as slowed tree growth or impacts on soil nutrients and infiltration rates, are usually secondary to economic ones.

Pine straw is usually harvested from the forest floor of three primary Southern pine species often grown by private landowners in plantation systems: longleaf, slash, and loblolly. Longleaf pine (*Pinus palustris*) once dominated the landscape of the U.S. South, but now accounts for approximately 3 million acres (less than 3 percent of its original range). Longleaf forests are home to a high diversity of plants and animals. Because of its ecological importance, there is a push among conservation organizations to restore the longleaf forest ecosystem. Though native to a wide variety of sites, longleaf pine grows better in sandy, well-drained soils than other tree species. The natural range of longleaf pine extends from southeastern Virginia, down along the Atlantic coast into northern Florida, and extending west into the coastal plains, piedmont, and ridge and valley regions of Georgia and Alabama, and into eastern Texas (3). Longleaf pine needles are approximately 20 to 46 cm (8 to 18 in) in length and usually occur in fascicles of three (15).

Slash pine (*Pinus elliottii*) has limited native range, growing from the southern tip of South Carolina through south Georgia, down into central Florida and west through south Alabama into southern Mississippi and a portion of eastern Louisiana (3). Its needles are usually 15 to 28 cm (6 to 11 in) long and occur in fascicles of two or three (15).

Loblolly pine (*Pinus taeda*) is considered the South's most commercially important species and accounts for more than one-half of the region's pine volume. Its native range includes 14 states, extending from southern New Jersey to central Florida and west into eastern Texas (3). Needles of the loblolly pine are usually 12 to 23 cm (5 to 9 in) long and occur in fascicles of three, sometimes four (15). Unlike the needles of slash and longleaf, which usually fall after two years, loblolly needles usually fall after three or four years.

In general, longleaf pine straw is considered to be the most popular (7, 8, 10, 11, 12). Longleaf trees produce longer needles that, because of a heavier waxy coating, are brighter in color and tend to last longer than those of other species (12). However, some pine straw buyers prefer loblolly or slash because the needles lay flatter and retain their initial appearance rather than settling over time.

Wolfe et al. (19) examined pine straw characteristic preferences among buyers of pine straw; however, their study was limited in size to 20 respondents and within a 60-mile radius of Eufaula, AL. The strongest characteristic preference among respondents was that pine straw be free of sticks and cones (90%), followed by free of leaves (75%). Results such as these have implications for landowners, who are expected by pine straw dealers to maintain clean, flat stands with little herbaceous material (16). More information is needed about pine straw buyer demands (e.g., volumes, discounts for bulk purchases, delivery, and timing of harvests) and preferences for species or bale characteristics (e.g., shape of the bale, material used for binding, and needle length and color).

An analysis of the pine straw market can help answer questions such as if there is room for more producers to enter the market and whether forestland owners would benefit from developing management regimes geared toward pine straw production and harvesting. Survey results can provide information about how landowners and suppliers can produce a higher-quality, more reliable product.

Materials and Methods

A mail survey was conducted in fall 2010 and administered according to Dillman's (5) Tailored Design Method (TDM), which calls for four mailings (a pre-notice letter, a first-round survey, a follow-up postcard, and a second-round survey).

The participant population for the survey was retail business owners or managers, landscapers, lawn maintenance specialists, landscape suppliers, and nurseries in Alabama. These types of businesses buy and sell pine straw. Owners and managers of such companies can provide insight to the pine straw market and identify consumer preferences, while providing data on sales volume and prices. Those selected for the study had operations in six metropolitan regions in Alabama (Huntsville, Birmingham, Montgomery, Mobile, Tuscaloosa, and Dothan). These regions were selected because they are in the top ten metro regions of the state and are geographically diverse. When running statistical analyses of the survey results data, the six regions were collapsed into four regions based on proximity to one another. The north region represents surveys received from Huntsville, the central region includes responses from Tuscaloosa and Birmingham (the cities are located in contiguous counties), the south-central region includes surveys from Montgomery, and the south region includes responses from Mobile and Dothan (cities located in the southern-most corners of the state). While loblolly and longleaf pine can be found growing in all of the surveyed regions, slash is most likely to be found in the south region, and longleaf is a major timber component in the south and south-central regions.

The survey was sent to 198 businesses in the six Alabama metro regions. Names and addresses for survey subjects were selected from a listing provided by the executive director of the Alabama Nursery and Landscape Association (ALNLA). Additional names and addresses were taken from publicly-available listings of businesses (such as the Yellow Pages). The questionnaire contained multiple-choice questions and fill-in-the-blank statements. Participants were also given the opportunity to make comments or provide additional information regarding pine straw sales in their region. After accounting for bad addresses and for those recipients that do not buy or sell pine straw, a response rate of 42 percent was attained. Missing data from returned surveys were excluded from each analysis.

Survey results were summarized and analyzed using multiple functions in Predictive Analytics Software (PASW), using a 0.05 alpha level to determine statistical significance. A number of tests were used and depended on the level of measurement being analyzed. One-way ANOVAs and pairwise comparisons were used to test for differences between groups regarding interval data while one-sample t-tests were used to observe differences across all respondents. Chi-square goodness of fit tested for differences among all respondents regarding nominal or ordinal data. Pearson's chi-square was used to test for differences between groups regarding nominal data. Kruskal-Wallis was used to test for differences in ordinal responses between groups. Mann-Whitney U tests checked for differences in ordinal responses between dichotomous groups.

Results and Discussion

Respondent types and purchase volumes. Of the 66 respondents, the majority were landscape contractors (47%), followed by retailers (29%), and lawn maintenance specialists (17%). The remaining respondents were categorized as 'other.' These respondents identified themselves as follows: a wholesale nursery, a wholesaler of plants and supplies, a plant grower and a 'pine straw re-wholesaler,' and a tree service. Responses were analyzed by respondent type and by bale shape. Pine straw is considered a seasonal product, but can be harvested year-round. Information collected on volume demands can be used by pine straw producers who may be interested in expanding operations or need guidance determining marketing channels. There is little information on how much pine straw is purchased by businesses, especially with regard to bale shape. Though there are no industry standards regarding bale size, round bales are generally much larger than square bales (12); an internet search of businesses that sell pine straw reveals that round bales usually weigh approximately 18 kg (40 lbs) and measure about 46 cm (18 in) in diameter.

For all respondents, the mean number of round bales purchased annually was 5,900 (Table 1). The mean number of round bales purchased at a single time was approximately 400. More landscape contractors purchased round bales than other respondent types; they also reported purchasing higher quantities on an annual basis, with a mean of more than 10,000 bales.

All respondents, on average, were buying more than 8,000 square bales per year and about 600 square bales at a single time. Retailers and 'other' respondents purchased the highest numbers of square bales on an annual basis (approximately 16,100 and 16,900, respectively). However,

Table 1. Number of bales of pine straw purchased annually and at a single time, by respondent type and bale shape.

	Mean	Minimum	Maximum	Standard deviation
All respondents (N = 66)				
Annually				
Square (N = 56)	8,272	50	100,000	17,840
Round (N = 6)	5,900	100	25,000	9,501
At a single time				
Square (N = 58)	635	10	7,500	1,047
Round (N = 7)	401	100	650	206
Landscape contractor (N = 31)				
Annually				
Square (N = 26)	4,423	50	26,000	5,691
Round (N = 3)	10,033	100	25,000	13,191
At a single time				
Square (N = 27)	727	10	7,500	1,451
Round (N = 4)	325	100	650	240
Retailers (N = 19)				
Annually				
Square (N = 16)	16,100	100	100,000	29,435
Round (N = 2)	2,000	1,500	2,500	707
At a single time				
Square (N = 17)	637	12	1,450	511
Round (N = 2)	440	400	480	57
Lawn maintenance specialists (N = 11)				
Annually				
Square (N = 9)	2,406	200	10,000	3,371
Round (N = 1)	1,300	—	—	—
At a single time				
Square (N = 9)	311	25	1,200	370
Round (N = 1)	630	—	—	—
Other respondents (N = 4)				
Annually				
Square (N = 4)	16,875	500	50,000	23,023
Round (N = 0)	—	—	—	—
At a single time				
Square (N = 4)	766	40	1,500	615
Round (N = 0)	—	—	—	—

the number of square bales purchased by retailers annually ranged widely, from 100 to 100,000. Landscape contractors and 'other' respondents purchased the highest numbers of square bales at a single time (both buying an average of more than 700 bales).

One-sample t-tests were run to observe whether the volumes purchased by respondents differed significantly across the whole state. There was a difference ($P = 0.001$) in volumes of square bales purchased on an annual basis among respondents, as well as in volumes of square bales purchased at a single time ($P < 0.001$). There was not a significant difference in volumes of round bales purchased annually ($P = 0.189$). Volumes of round bales purchased at a single time, however, did vary among respondents ($P = 0.002$). Further analyses were conducted to determine where these differences lie among the buyer type groups.

One-way ANOVAs were run on purchase volumes of pine straw by buyer type. Annual purchases of square bales was not influenced by the type of buyer ($P = 0.104$). Pairwise comparisons determined significant differences ($P = 0.040$) only between retailers and landscape contractors. On an annual basis, retailers purchased more pine straw than landscape contractors. However, Levene's statistic for the ANOVA test of annual purchases of square bales was 7.787, yielding a $P < 0.001$. Thus, homogeneity of variance cannot be assumed. We cannot be certain that the differences observed between the buyer types are attributable to the conditions of each group; there may be an interaction effect from some exogenous variable.

The one-way ANOVA of single-time purchases of square bales by buyer type was not significant ($P = 0.784$) and supported by Levene's statistic ($P = 0.383$). Pairwise comparison tests did not reveal any differences ($P > 0.05$) between the respondent types. Thus single-time purchase volumes of square bales of pine straw were similar among the respondents. Pairwise comparison tests of single and annual purchases of round bales did not reveal differences among buyer types, probably largely due to the low numbers of respondents who reported purchasing pine straw in round bales.

Although the one-sample t-tests suggest variability in the volumes purchased annually and at a single time for square bales, and at a single time for round bales, further analyses did not provide much indication that these differences are due to buyer type. It appears, however, that retailers purchase significantly more square bales of pine straw on an annual basis, even if volumes of single-time purchases are almost equal to the mean volumes purchased by all respondents.

Respondents were also asked to rank each month of the year in terms of seasonality as a buyer of pine straw, with 1 = busiest to 4 = least busy. The busiest months are in spring (March, April, and May) while the slowest months are in winter (December, January, and February). These findings are interesting to note because most harvesting occurs around the time when (or shortly after) needle fall is highest — typically in September, October, and November. Therefore, straw is frequently harvested a full six months before demand peaks.

Landowners' pine straw operations may be better suited to meet the demands of particular buyer types, depending on quantity of straw available, consistency of availability, harvesting methods used (i.e. mechanical or manual), and timing of harvests. Landscape contractors buy higher numbers of round bales while retailers appear to need higher numbers of square bales throughout the year. Round bales are generally much larger than square bales; therefore, though respondents reported purchasing fewer round bales on average (both annually and at a single time), it is likely that these purchases represent greater volumes of pine straw than for square bales.

Pine straw species and origins. All respondents were asked 'What species of pine straw do you usually purchase?' Responses were not mutually exclusive (all possible combinations for which responses were received are reported in Table 2). Approximately 43 percent of the respondents purchased longleaf, about 38 percent purchased slash, and about a fourth reported buying loblolly. Eighteen percent of respondents said they did not know what kind of pine straw they buy. Almost half of the respondents from the north region did not know what species of pine straw they purchased (Table 2). In the south region only two respondents (10.5%) did not know. This region is the closest to more established pine straw markets in southwest Georgia and the Florida panhandle. Here 84 percent of respondents reported buying slash, longleaf, or both. Only one respondent reported buying loblolly, but in combination with slash and longleaf. In the central region (Birmingham and Tuscaloosa) respondents reported buying each of the species, with loblolly and/or slash yielding slightly higher responses. In the south-central region, most respondents reported buying longleaf, though several reported buying loblolly or slash.

A chi-square goodness of fit test was calculated to see if there were differences among all respondents in terms of what species they purchased, with expected frequencies evenly distributed among the various species, species combinations, and 'unknown' response category. The test yielded a chi-square statistic of 20.820 and a P value of 0.002. Further tests were conducted to determine where these differences among respondents lie.

Pearson's chi-square tests were run to determine differences between the regions in their responses to whether they purchased the species or species combination (or if the species they purchased was unknown). There were no statistical differences between the regions. However, differences among the regions were suggested by a probability level of 0.074. It is likely the sample is too small, or the number of possible species groupings too high, to verify differences at a statistically significant level. Standardized residuals are included in the cross-tabulation in order to identify where strong differences lie. Two groups were significant: respondents in the central region buying loblolly and respondents in the south region buying slash and longleaf. In both cases, the observed frequencies were significantly higher than expected frequencies.

Respondents were also asked to rank each species in terms of preference with 1 = most desired, 2 = second most desired, and 3 = least desired. There was a strong preference among respondents for longleaf. Of valid responses for the species, 89 percent ranked it as the 'most desired' species. Approximately 16 and 13 percent of respondents ranked slash and loblolly as the 'most desired' species, respectively. Note that some respondents gave more than one species a 'most desired' ranking. Approximately 45 percent of respondents ranked slash as the 'least desired' species, while 38 percent said loblolly was the least desired. Approximately 19 percent of valid responses expressed no preference, which is

Table 2. Cross-tabulation of species of pine straw purchased by respondents, by region[z,y].

Species purchased		Region				Total
		North (N = 8)	Central (N = 25)	South-Central (N = 13)	South (N = 20)	
Loblolly only	Count	1	7	1	0	9
	Std. residual	0.0	2.0*	–0.6	–1.7	
Slash only	Count	0	5	2	5	12
	Std. residual	–1.2	0.2	–0.2	0.7	
Longleaf only	Count	2	5	4	7	18
	Std. residual	0.0	–0.7	0.2	0.6	
Loblolly and slash	Count	0	3	0	0	3
	Std. residual	–0.6	1.8	–0.8	–1.0	
Slash and longleaf	Count	0	0	1	4	5
	Std. residual	–0.8	–1.4	0.0	2.0*	
Loblolly, slash and longleaf	Count	1	0	1	1	3
	Std. residual	1.1	–1.1	0.5	0.1	
Unknown	Count	3	3	3	2	11
	Std. residual	1.5	–0.6	0.6	–0.8	
Total	Count	7	23	12	19	61

[z]Standardized residuals are given as a Z score; with an alpha of 0.05, the critical value is ± 1.96.

[y]$X^2 = 27.302$, P = 0.074.

*P ≤ 0.05.

not surprising given that 18 percent of respondents did not know what species of pine straw they were purchasing. This suggests that those who are familiar with the three species have preferences.

The species preferences variables were analyzed as ordinal (ranked from 1 to 3, with 1 indicating strongest preference), and Mann-Whitney U tests were performed to evaluate stated preferences by species purchased (three dichotomous variables; Table 3). Analyses of these results can provide insight to whether purchases are being made based on preferences or market availability. Those who purchased loblolly pine straw were more likely (P < 0.05) to state a preference for loblolly than those who did not purchase loblolly. Those who purchased slash were less likely (P < 0.05) to state preference for loblolly, but more likely (P < 0.001) to state a preference for slash. Buyers of longleaf were more likely to express a preference for this species than those who did not buy longleaf, but this relationship was not significant. This suggests less of a difference in terms of preference for the species between buyers and non-buyers of longleaf.

Respondents were asked to estimate the distance between the origin (i.e. the forest) of the pine straw they purchase and their place of business. Overall, more than one-fourth of all respondents did not know where their pine straw was coming from. Approximately one-third of respondents reported buying their pine straw from more than 150 miles away. Several respondents wrote in responses, saying they purchased their straw from southwest Georgia or the Florida panhandle. A chi-square goodness of fit test was conducted to see if there were differences among respondents with regard to distance

Table 3. Mann-Whitney U tests of differences in preference for pine straw species between buyers and nonbuyers of species[z].

		Preference for loblolly			Preference for slash			Preference for longleaf		
		N	Mean rank	P	N	Mean rank	P	N	Mean rank	P
Loblolly	Purchase	13	15.35		11	22.91		9	20.28	
	Do not purchase	30	24.88	0.012*	32	21.69	0.763	31	20.56	0.910
	Total	43			43			40		
Slash	Purchase	17	26.94		24	28.50		15	21.93	
	Do not purchase	26	18.77	0.022*	19	13.79	0.000***	25	19.64	0.295
	Total	43			43			40		
Longleaf	Purchase	21	23.81		21	25.33		22	18.93	
	Do not purchase	22	20.27	0.312	22	18.82	0.065	18	22.42	0.102
	Total	43			43			40		

[z]The test statistic (U) is converted to a Z score; with an alpha of 0.05, the critical value is ± 1.96.

*P ≤ 0.05, **P ≤ 0.01, ***P ≤ 0.001.

Table 4. Cross-tabulation of known distance of business from pine straw origin (i.e. forest), by region[z].

Distance (miles)	Region				
	North (N = 8)	Central (N = 25)	South-Central (N = 13)	South (N = 20)	Total
<10 to 50	1	4	2	11	18
51 to 150	0	0	4	3	7
>150	2	13	4	2	21
Total	3	17	10	16	46

[z]Kruskal-Wallis $X^2 = 12.178$, $P = 0.007$.

from where the pine straw they purchased comes from. Expected frequencies of responses from those who knew the origin of the straw they purchased were evenly distributed among three categories: less than 50 miles, 51 to 150 miles, and more than 150 miles. A chi-square statistic of 7.087 was produced with a P value of 0.029. Further tests were conducted to determine where the differences lie among respondents.

Table 4 displays responses of those who know the origin of the pine straw, given by region. Half of the respondents from the north region did not know the origin of the pine straw they purchased. In contrast, the majority of respondents in the south region knew the origin of the pine straw and reported buying straw sourced from forests within 50 miles. Buyers in the central and south-central regions appear for the most part to be buying pine straw from farther distances (more than 150 and 50 miles, respectively).

A Kruskal-Wallis test was performed to observe differences between regions with regard to distance of origin of pine straw; the test used only responses from those who knew the origin of the pine straw they purchased. A chi-square value of 12.178 ($P = 0.007$) demonstrated that the differences observed among regions based on reported distance to origin of pine straw are unlikely to be due to chance.

Because the Kruskal-Wallis test gave a significant result, it was followed by pairwise Mann-Whitney U tests to determine which regions differ. Four of the region pairs (north and central, north and south-central, north and south, and central and south-central) did not prove to be statistically different. The other two pairs yielded significant differences: central and south ($Z = –3.238$, $P = 0.001$), and south-central and south ($Z = –2.352$, $P = 0.019$). It is clear when observing mean ranks produced by the Mann-Whitney U tests that buyers in the south region (Mobile and Dothan) purchased their pine straw from shorter distances than buyers in the central (Birmingham and Tuscaloosa) and south-central (Montgomery) regions. It is likely that there were too few responses from the north region (only three respondents reported distances) to yield significant results from pairwise comparisons with other regions.

Characteristic preferences. Respondents to the mail survey were asked to express their preferences in terms of bale shape, binding, and method used to bale pine straw. Response categories were mutually exclusive with a 'no preference' response option given. Seventy-seven percent of respondents preferred square bales, 13 percent preferred round bales, and 10 percent expressed 'no preference' for either bale shape. This finding is interesting given that fewer respondents reported purchase volumes for round bales than expressed preference for round bales. Round bales, which are harvested mechanically by special balers and are generally larger, may be less available in certain markets. When it came to bale binding, there was a strong preference for bales bound with twine — 85 percent. Seven percent preferred bales bound with wire and eight percent expressed 'no preference.' Issues associated with wire binding include difficulty of removal and risks associated with leaving cut wires lying on the ground. Wolfe et al. (19) found that buyers had a preference for hand-baled pine straw because of ease of application. However, our respondents appeared to feel differently — 53 percent preferred machine-baled pine straw. Only 20 percent expressed a preference for straw baled by hand. Approximately 27 percent stated 'no preference' when it came to baling method.

Respondents were also asked to rank the level of importance that the pine straw they purchase possess a number of characteristics. Respondents ranked each of the 12 characteristics listed as 'not important,' 'somewhat important,' or 'very important.' Results can be seen in Fig. 1. The strongest characteristic preference among respondents in Wolfe et al.'s study of pine straw buyers was that pine straw be free of sticks and cones (90%), followed by free of leaves (75%). The pine straw characteristic most important to respondents in this study was 'no weeds or briars,' with 95 percent of respondents reporting this as 'very important.' The second most important characteristic was 'no foreign material (trash).' Less than half of the respondents stated that 'long needles' was a 'very important' characteristic; 11 percent stated the characteristic was 'not important.' This result was surprising given the strong preference among respondents for longleaf pine straw. Perhaps other characteristics of longleaf (such as its lasting color or structural longevity), rather than needle length, are what make it more desirable. Only 30 percent of respondents reported 'needles not broken' as 'very important;' however, 67 percent stated this characteristic was 'somewhat important.' Almost half of the respondents (48%) stated that it was 'not important' that the pine straw they purchase be 'harvested locally;' only 8 percent considered this as 'very important.'

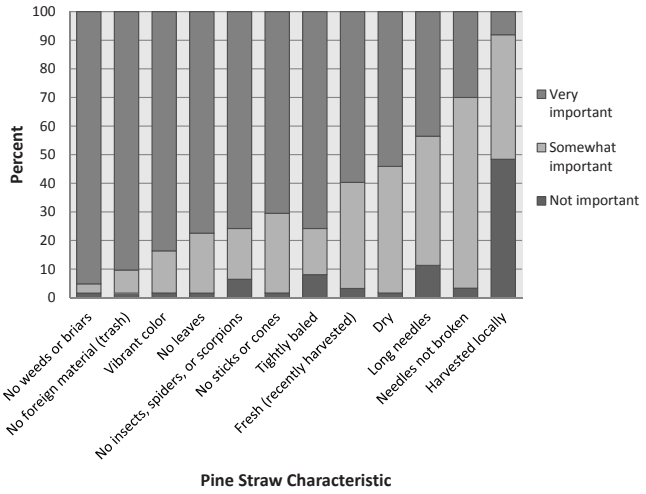

Fig. 1. Importance of pine straw characteristics by percent response, 2010 mail survey of businesses that buy and sell pine straw in six metro regions of Alabama, N = 66.

The findings presented here are important to note because of the implications for landowners considering how best to utilize resources and prepare a site for pine straw harvesting operations. Based on respondents' strong preferences for straw that is free of foreign material as well as weeds and briars, keeping a clean stand and applying herbicide are clearly important components of a site preparation plan. Also, if needle length is less of a concern, then mechanical baling (which can cause breakage) can be a better option because it is less expensive than hand baling.

This study is an attempt to fill an information gap in the literature about pine straw and consumer demands. Like those surveyed by Wolfe et al. (19), respondents stated preferences for bales bound with twine and for straw that is clean. There were differences between the two respondent groups in terms of other pine straw characteristic preferences; however, those in Wolfe et al.'s (19) study did not specify what species they purchased. Further research could shed light onto how characteristic preferences or importance placed on certain qualities varies based on species purchased. Another study with larger sample sizes may also allow for more in-depth exploration of differences among buyer types and by regions.

Findings presented here indicate there may be more room in the market for round bales and that year-round availability of pine straw may be more of an issue for retailers than for other buyer types. Results suggest that purchases are not strictly driven by availability. The overall preference for longleaf pine straw (even among non-buyers) implies there is a market for this species, even in regions where it is less available. However, stated preferences for loblolly and slash among those who are already purchasing these species show there remains a market for them as well, which is good news for landowners who may already have loblolly and slash stands and are not interested in converting to or intensively managing longleaf.

If opportunities for landowners and product selection for buyers are to expand and improve, increased awareness of variations in product quality, and the practices used to produce, harvest, and market pine straw is required by all parties. Landowners need to be aware when beginning pine straw operations of site preparation requirements and how management practices impact product quality or prices paid for their straw.

Based on the wide ranges of purchase volumes reported, the long distances from which many respondents buy pine straw, and stated preferences for all three species, there is room for more Alabama producers to enter the market. Extra income earned from selling pine straw can be used by landowners to cover living expenses, property taxes, or to further invest in land management. The demand for longleaf pine straw in particular suggests there may be lucrative market opportunities for landowners, especially in South Alabama. This non-timber forest product may provide enough short-term income to allow landowners to keep (or put) their lands in longleaf and manage on longer rotations, thus conserving this ecologically-important species.

Currently, the pine straw market is informal in nature. While this may work to the advantage of some industry players, it likely contributes to information gaps among those with the potential to boost industry presence in Alabama. It is unknown how establishing industry standards (e.g., standard bale sizes) or stricter regulations may affect markets. Formation of landowner associations or industry organizations that create and clarify linkages between actors in the commodity chain may help to solidify the market and allow entry by smaller producers and dealers.

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