ASSESSING THE GROWTH POTENTIAL AND FUTURE OUTLOOK FOR THE US MAPLE SYRUP INDUSTRY

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Abstract: There is currently a tremendous opportunity to increase the amount of maple syrup produced in the US. This paper addresses the number of potentially tappable maple trees, the factors that affect their utilization for syrup production, and the overall future outlook for the maple industry. The latest USFS FIA data for 19 states was analyzed in order to estimate the number of potential taps while the utilization rate was based on the 2008 NASS data. The US currently only taps .4% of all potentially tappable maple trees, with the highest percentage of trees tapped in Vermont, at 2.1%. If all states were to tap the same percentage of maples that sugarmakers in Vermont do, the resulting economic impact would be over $300 million annually. During the current economic recession, there is increasing attention given to strategies aimed at growing the US maple industry. Demand is still strong, prices are at record levels, and many sugarmakers are expanding their operations while others are just getting started. Although the current outlook is bright, long-term concerns for the US maple industry include climate change, the exchange rate and production levels in Canada, invasive species such as Asian longhorn beetle, and the overall global economic outlook.

Keywords: maple syrup, economics, FIA, sugar maple, red maple, sustainability

INTRODUCTION

Worldwide consumption of pure maple products has been steadily rising with demand far outpacing supply in recent years. The US currently imports four times as much syrup from Canada as it produces, so there is tremendous room for expansion just to fill domestic markets (Agriculture Canada 2006). Maple syrup was once a much larger component of the rural economy, as the US produced a record equivalent of 6,613,000 gallons of maple syrup in 1860, with most of the syrup actually boiled down further to produce granulated maple sugar (US Census 1860). Maple production has fallen dramatically over the years, with only 1,635,000 gallons produced in 2008 (NASS 2008).

The situation today is improving. Demand is up and prices are at an all time high, so many sugarmakers are in the process of expansion and new producers are entering the market (Dravis 2009). The interest in increasing production is so great that Senator Charles Schumer (D-NY) introduced legislation in April 2008 that was reintroduced in March 2009 by Schumer and Rep. John McHugh (R-NY) that would provide grants and incentives to states in order to increase the number of trees being tapped on private lands (Churchill 2008, Schwaner-Albright, 2009). In order to determine the growth potential and economic impact of the maple industry, this paper assesses the number of tappable maple trees in US forests, current and potential economic
impacts of the maple industry, strategies for increasing production, and the long-term outlook for maintaining a vibrant maple industry.

ASSESSING THE TAPPING POTENTIAL

In order to determine the tapping potential in the US, analyses were performed using the latest US Forest Service Forest Inventory & Analysis (FIA) data from 19 states that contain a significant number of sugar (Acer saccharum) and red maples (Acer rubrum). For an overview of the history, background, and methodology used in the FIA program, please refer to [http://fia.fs.fed.us/](http://fia.fs.fed.us/). The number of potential taps were estimated by summing all of the sugar and red maples greater than 10" dbh and applying conservative tapping guidelines-1 tap for a 10-17" tree and 2 taps for trees 18" and greater. The data are classified by ownership category—private, US Forest Service, other federal land, and state & local government. They are also divided between the tappable (non-reserved) and non-tappable (reserved) trees, as many forestlands that are legally prohibited from timber production are also likely to be restricted from tapping.

**Figure 1. Number of potential taps by state and ownership category.** Analysis based on latest FIA data for each state analysis using conservative tapping guidelines.

The figures presented in this paper overestimate the actual tapping potential for several reasons. In order to economically tap maples, the trees must be located close enough to a road and the
density must be high enough to justify collecting the sap. Research is currently in progress to refine the data based on these factors. The first step is to recalculate the number of potential taps by only counting the maple trees that occur in plots containing a minimum of 20 taps/acre in order to meet minimum density requirements. Once these plots have been identified, further spatial analysis with GIS will determine the distance of the plots to a road. Maple trees that are located $\geq 1$ mile from the nearest access road will be eliminated, as it would be considered too difficult to economically tap and gather sap from these trees. Conducting these two basic analyses will provide a much more refined estimate of the number of potential taps, but it is far from perfect and is limited by the nature of the FIA data.

There are a number of other factors that impact the actual tapping potential. Topographic features certainly affect how easy and practical it is to gather sap. For instance, areas that are too flat, particularly those found along floodplains, are very difficult to access during sugaring season, and setting up tubing systems (even with vacuum) is difficult without sufficient grade. Conversely, very steep hillsides are nearly impossible to collect with buckets and require significant athleticism to set up tubing systems and tap the trees. Furthermore, analyzing individual FIA plot data fails to account for the total number of forested acres surrounding the plots, which has a direct influence on the commercial potential for tapping. In order to justify setting up a vacuum tubing system, there should be enough trees at put out at least 1,000 taps, which usually requires at least 15 acres. While small tracts of $\leq 15$ acres are adequate for hobbyists and small-scale producers, much larger acreage is required to justify tapping for commercial syrup production.

Finally, it is important to note that the FIA data do not account for a significant percentage of the trees that are actually tapped. Maples growing in yards, parks, and along roads are favored by producers who collect with buckets due to the easy access and large volumes of sweet sap they generate. In order to quantify these potential taps, much more detailed inventory data must be collected by urban forestry research methods.

**POTENTIAL ECONOMIC IMPACT OF THE US MAPLE INDUSTRY**

Significant differences exist in the extent of maple syrup production throughout the United States. Vermont clearly dominates the industry due to its relatively high utilization rate while states such as Michigan, New York and Pennsylvania have tremendous potential for expansion. USDA’s National Agricultural Statistics Service only tracks maple syrup production for 10 states and Indiana’s data were provided by the Indiana Division of Forestry. Therefore, 8 of the states listed in Table 1 are lacking current information on the number of taps and the corresponding utilization rate. It is assumed that syrup production levels are so low that it is not worth the trouble to track production in these states. For some of the states, such as Kentucky and Tennessee, even though maples grow abundantly, the climate may not be suitable for commercial syrup production. More research is needed to determine the potential for sap flow and the economic feasibility of producing maple syrup in the winter months along the southern range of sugar maple.

<table>
<thead>
<tr>
<th>State</th>
<th>Number of Potential Taps</th>
<th>Number of Taps in 2008</th>
<th>2008 Utilization Rate</th>
<th>Number of taps based on Vermont’s utilization rate</th>
<th>Possible Annual Production using Vermont’s utilization rate</th>
<th>2008 value of syrup production</th>
<th>Possible average value of syrup production based on Vermont’s utilization rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>30,097,870</td>
<td>62,000</td>
<td>0.21%</td>
<td>634,667</td>
<td>126,933</td>
<td>$600,000</td>
<td>$5,077,335</td>
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<td>Illinois</td>
<td>12,187,490</td>
<td>-</td>
<td>-</td>
<td>256,959</td>
<td>51,399</td>
<td>-</td>
<td>$2,055,958</td>
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<td>Indiana</td>
<td>96,985,249</td>
<td>28,837</td>
<td>0.05%</td>
<td>1,189,046</td>
<td>237,809</td>
<td>$391,320</td>
<td>$9,512,368</td>
</tr>
<tr>
<td>Kentucky</td>
<td>66,236,188</td>
<td>-</td>
<td>-</td>
<td>1,396,707</td>
<td>279,341</td>
<td>-</td>
<td>$11,173,657</td>
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<td>Massachusetts</td>
<td>485,413,211</td>
<td>220,000</td>
<td>0.45%</td>
<td>1,023,008</td>
<td>204,602</td>
<td>$2,200,000</td>
<td>$8,184,064</td>
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<tr>
<td>Maryland</td>
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<td>28,837</td>
<td>0.05%</td>
<td>99,500</td>
<td>-</td>
<td>$391,320</td>
<td>$1,800,013</td>
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<td>Maine</td>
<td>147,702,680</td>
<td>1,270,000</td>
<td>0.86%</td>
<td>3,14,572</td>
<td>622,914</td>
<td>$8,600,000</td>
<td>$24,916,578</td>
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<tr>
<td>Michigan</td>
<td>260,206,740</td>
<td>405,000</td>
<td>0.16%</td>
<td>5,486,919</td>
<td>1,097,384</td>
<td>$4,000,000</td>
<td>$43,895,355</td>
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<tr>
<td>Minnesota</td>
<td>37,244,260</td>
<td>-</td>
<td>-</td>
<td>785,361</td>
<td>157,072</td>
<td>-</td>
<td>$6,782,889</td>
</tr>
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<td>Missouri</td>
<td>9,908,335</td>
<td>-</td>
<td>-</td>
<td>210,200</td>
<td>42,040</td>
<td>-</td>
<td>$1,681,600</td>
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<td>New Hampshire</td>
<td>74,865,853</td>
<td>360,000</td>
<td>0.48%</td>
<td>1,578,700</td>
<td>315,740</td>
<td>$3,400,000</td>
<td>$12,629,600</td>
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<tr>
<td>New York</td>
<td>293,247,888</td>
<td>1,480,000</td>
<td>0.50%</td>
<td>6,183,650</td>
<td>1,236,730</td>
<td>$12,800,000</td>
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<td>Ohio</td>
<td>79,938,332</td>
<td>395,000</td>
<td>0.49%</td>
<td>1,685,641</td>
<td>337,128</td>
<td>$4,720,000</td>
<td>$13,485,129</td>
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<tr>
<td>Pennsylvania</td>
<td>265,209,912</td>
<td>475,000</td>
<td>0.18%</td>
<td>5,927,420</td>
<td>1,118,484</td>
<td>$3,800,000</td>
<td>$44,739,361</td>
</tr>
<tr>
<td>Tennessee</td>
<td>60,768,756</td>
<td>-</td>
<td>-</td>
<td>1,281,417</td>
<td>256,383</td>
<td>-</td>
<td>$10,251,334</td>
</tr>
<tr>
<td>Virginia</td>
<td>68,737,448</td>
<td>-</td>
<td>-</td>
<td>1,449,451</td>
<td>289,890</td>
<td>-</td>
<td>$11,505,605</td>
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<tr>
<td>Vermont</td>
<td>106,701,981</td>
<td>2,250,000</td>
<td>2.1%</td>
<td>2,250,000</td>
<td>450,000</td>
<td>$20,000,000</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>146,211,771</td>
<td>540,000</td>
<td>0.37%</td>
<td>3,081,236</td>
<td>616,247</td>
<td>$5,200,000</td>
<td>$24,649,888</td>
</tr>
<tr>
<td>West Virginia</td>
<td>120,793,900</td>
<td>-</td>
<td>-</td>
<td>2,547,153</td>
<td>509,431</td>
<td>-</td>
<td>$30,377,324</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,908,525,926</strong></td>
<td><strong>7,455,837</strong></td>
<td><strong>0.39%</strong></td>
<td><strong>40,244,645</strong></td>
<td><strong>8,048,929</strong></td>
<td><strong>$65,791,320</strong></td>
<td><strong>$321,957,161</strong></td>
</tr>
</tbody>
</table>

To estimate the potential for increasing production, calculations were performed to determine the number of taps that could be put out on an annual basis if 2.1% of the total number of potential taps were used. This is the percentage of trees that are tapped in Vermont, which represents the current upper limit for what is realistic in other states. Annual syrup production was estimated based on an average yield of .2 gallons/tap/year. It is worth noting that new vacuum tubing can result in yields as high as .5 gallons/tap whereas traditional bucket systems may only yield .1 gallons/tap. Values were estimated by multiplying possible production figures by a very conservative price of $40/gallon. If one was to account for the additional value of selling syrup in retail containers, producing value-added maple confections, and the associated revenues generated through agri-tourism events such as Maple Weekend, the economic impact would be significantly greater than the $321 million figure displayed in Table 1.

**STRATEGIES FOR INCREASING PRODUCTION**

Public policies can have a significant impact on syrup production levels. This is evidenced in Quebec, where roughly 75% of the world’s syrup is now produced. Although they have far fewer maples than the US, government support for the maple industry in Quebec has led to a surge in production over the past 30 years. The government has implemented cost-sharing programs for producers to purchase the necessary equipment to develop cost-effective sugaring operations. Crown land has also been made readily available for tapping under very favorable lease rates. In fact, recent studies concluded that the net benefits of using public forests in Quebec for syrup production are greater than using them solely for timber management (MRN-
For comparison purposes, approximately 25% of the total potential taps in the US occur on government owned land, yet hardly any of these trees are made available for tapping.

It is clear that more favorable government policies and support could greatly benefit the US maple industry. In April 2008 and again in March 2009, Senator Charles Schumer (D-NY) introduced the Maple Tapping Access Program Act. This would provide competitive grants to states to increase the number of trees being tapped on private lands. Until now, only limited federal resources have been devoted towards maple production, the vast majority of which have been directed towards Vermont. Additional resources are expected to benefit the maple industry through the latest Farm Bill, as the Specialty Crops legislation and Beginner Farmer & Rancher Development Program both serve as potential funding sources to help grow the industry.

Socioeconomic and cultural factors also play a crucial role in determining where and to what extent syrup production occurs (Hinrichs 1998). In order to transform sap flowing in trees into maple syrup, there must be a willing and able workforce that has the knowledge, desire and ability to do so. To this end, additional extension efforts could be focused on educating landowners about the opportunities and methods of getting into maple production. In a country that has been losing manufacturing jobs at an alarming rate, it is important to recognize that each sugarhouse is a small factory converting an abundant natural resource unique to North America into a valuable with increasing worldwide demand. Rural development programs in the northeast could provide incentives, low-interest loans and training opportunities to attract more landowners into syrup production.

If the US devotes additional resources towards increasing production of pure maple syrup, it is also essential to devote sufficient resources towards marketing and promotion. The Canadians increased production drastically in the 1990s but did not invest enough in selling their product. A large surplus developed and prices plummeted, so they instituted a quota system in 2003 to limit supply and drive prices back up. Producers also organized a marketing board and started devoting substantial resources towards international marketing and promotion (Gagne 2008). Their efforts have paid off, as prices are at an all time high, the surplus has been exhausted, and there is now a worldwide shortage of pure maple syrup (Dravis 2008a). In order to maintain syrup production as a profitable enterprise, it is important to remember this lesson and keep sales on pace with increased production.

FUTURE OUTLOOK AND CONCERNS FOR THE US MAPLE INDUSTRY

There is significant concern about the sustainability of the maple syrup industry in North America (Whitney and Upmeyer 2004). While the current outlook is bright, there are important variables that could have drastic impacts on US maple production. These include climate change, the exchange rate and production levels in Canada, invasive species such as Asian longhorn beetle, and the fate of the global economy.

Many scientists are rightfully concerned about the impact of climate change on the North American maple syrup industry (MacIver et al. 2006, Rock & Spencer 2001). The rise in global temperatures has already influenced the timing of sap flow and will continue to do so in the
future (Chabot and Childs 2007). Long term climate projections are not favorable for sugar maple throughout much of its range in the eastern US (Iverson et al. 2006). However, despite these gloomy projections, the current climate is still favorable for sap flow and producers can adjust the timing of tapping to take advantage of earlier sap flows (Wilmot 2008, Dunn 2008). Furthermore, FIA data seem to suggest that shade-tolerant maples are increasing in abundance underneath the oak-hickory dominated forest on southern edge of sugar maple’s range. Further research and monitoring is needed to determine the effect of climate change and other variables on long term distribution trends. In fact, how we manage our forests, deer populations, acid rain, and invasive species could have a larger effect on sugar maple distribution than climate change.

Even if sugar maples decline in northeastern forests, red maples are likely to continue to increase in abundance. Although red maples typically contain lower sap sugar content and bud out earlier in the spring, they are an acceptable and widely used species for syrup production (Chapeskie et al. 2006). With increased use of reverse osmosis technology to remove most of the water in sap before boiling, sap sugar content is not as important as it used to be and red maples will continue to gain wider acceptance among sugarmakers.

The Canadian exchange rate has a direct influence on the profitability and production levels of US maple syrup. When the US dollar is strong, it is cheaper for US bottlers and distributors to buy Canadian syrup. In the past, American sugarmakers have reduced production when they could not compete with cheaper Canadian syrup. This phenomenon could resurface if the US dollar remains strong compared to the Canadian dollar. Canadian production has also been low in recent years due use of a quota system coupled with poor weather. However, if Quebec continues to relax the quota system and they have a couple years of favorable weather, there could be a large spike in Canadian production. This could temporarily drive global prices down, threatening the profitability and desire to expand among US producers.

The Asian longhorn beetle (ALB) has been found in several port cities over the past decade and eradication efforts so far have been mildly successful. This pest was recently found in Worcester, MA very close to abundant hardwood forests (Dravis 2008b). If the ALB is able to escape into the wild, it could have devastating effects on not only the maple syrup industry, but many other industries that rely on healthy northern hardwood forests. It is imperative to eradicate ALB from the Worcester area and continue to make sure that ALB stays out of the northeastern forests.

Finally, the fate of the global economy could have a strong influence on demand for maple syrup. Pure maple products are a luxury item that some economists consider to be recession proof (Thomas and Schumann 1994). However, if the global economy continues to slump, sales should be affected to a certain degree. Maple producers will have to be more aggressive in their marketing and promotion efforts in order to keep the local and international markets thriving. Per capita consumption of pure maple syrup in the US is currently very low, so there is tremendous room for growth, especially in the niche markets focused on local and healthy foods.

CONCLUSION

The US has a tremendous resource of untapped maple trees that could be utilized to fill the growing worldwide markets for pure maple syrup. Although there are concerns about long-term
sustainability, the current climate is very favorable to increasing production. In fact, getting more landowners involved in maple production and more Americans consuming pure maple syrup is an effective mechanism to ensure the sustainability of sugar maples in the US. We only devote time and resources to the things we care about— if maple syrup was more integral to our entire nation’s identity, as it is in Quebec and Vermont, we would likely do more to ensure that maples persist in our future forests.

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LITERATURE CITED


