

Maple Syrup Energy Use Survey Summary- 2003

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A survey of members of the Wisconsin Maple Syrup Producers Association was conducted in October 2003 to determine the amount and types of fuels being used for primary evaporation during the production of maple syrup. Out of 125 surveys sent out, 64 were returned with 62 being usable for the summary.

The survey respondents produced 16,094 gallons of maple syrup during the 2003 season which represents 21% of the syrup produced based on the USDA-NASS 2003 survey estimates of 76,000 gallons produced. Maple syrup yields were down 19% for the 2003 season based on producers reported average yields. Fuel sources reported included wood, fuel oil, LP gas and natural gas.

Wood was the most popular fuel, reported by 51 producers (82%), but it represented only 46% of the syrup produced. Many producers reported burning old pallets and other scrap wood. The average production was 144 gallons per producer with a range from 1 to 1100 gallons. The mean was 100 gallons. Wood burning producers used buckets or bags 1.5 times more often than tubing and of those using tubing only 4 of 18 reported using vacuum assist. Figure 1 shows the distribution of producers burning wood by production levels and number of producers.

Fuel oil was used by 9 producers (14.5%) but represented 48% of the maple syrup produced during 2003. The average production was 856 gallons per producer with a range from 215 to 2720 gallons. Figure 2 shows the distribution of producers using fuel oil by production levels and number of producers.

One producer each used natural gas (1.6%) and LP gas (1.6%). Non-wood burning producers used tubing 3.6 times more often than buckets or bags and they all used vacuum assist which can increase sap yield per tap. For all producers, Bucket or bags were used 42% of the time while tubing was used 58% of the time. Figure 3 shows a breakdown of all producers by production levels and numbers of producers. Figures 4 and 5 shows the percentage of producers by fuel and percentage of production by fuel type.

Energy Efficiency

Fuel efficiency for non-wood fuels ranged from 133,250 BTU/gallon for a producer using a reverse osmosis system to 454,000 BTU/gallon with an average of 331,000 BTU/gallon. Wood-fueled evaporators had a wide range of efficiencies: from 170,000 BTU/gallon for a producer who used a preheater, economizer and a reverse osmosis unit to 5,343,000 BTU/gallon.

The wide range may have to do with measurement error, the definition of a "cord of wood" and low efficiency of open pan boiling practiced by some respondents. There may have been confusion on whether "cord" meant a "face cord", "fireplace cord" or full cord. Some respondents indicated full or face cord; this will need to be more cleanly defined in any future surveys.

The literature does indicate that generally wood-fired evaporators are not as efficient as oil-fired or gas-fired units with efficiencies often in the 30 to 40% range. Typical efficiencies noted in the North American Maple Syrup Producers Manual for wood-fired evaporators is 25 gallons per full cord of wood which would be equivalent to an efficiency of about 40%.

Energy conservation equipment

Producers were asked whether they were using energy conserving equipment such as preheaters, economizers/piggy-back or reverse osmosis units. Of the non-wood fueled evaporators, ten of eleven (90%) were using some type of energy conservation measure.

Two producers were using both a preheater or economizer and a reverse osmosis unit while one producer was using a reverse osmosis unit without any additional heat recovery equipment. Of the remaining producers, four were using an economizer and one was using only a preheater. Preheaters were used 41% of the time with the wood-burning evaporators (21 of the 51 respondents) with only two using an economizer. Five wood-burning producers reported using a reverse osmosis unit (10%) and all reported using a preheater. One producer was using both a preheater and an economizer unit with the reverse osmosis unit.

The average producer using a reverse osmosis unit produced 811 gallons of maple syrup in 2003 with a range from 215 to 2720 gallons. Three of the producers, who were using a reverse osmosis unit, had an average energy efficiency of 162,000 BTU/gallon of maple syrup produced, about half the energy use by the average non-wood fueled evaporator.

Three producers indicated plans to upgrade evaporators before the 2004 season and five indicated plans to upgrade within 1 to 2 years. Five producers indicated they plan to add heat recovery equipment within 1 or 2 years.

Expansion:

Producers were asked if they had plans to increase production to get an idea of the growth of the industry. Ten producers indicated plans to increase production in 2004 and five in 1 or 2 years. The respondents indicated plans to add approximately 9250 taps to the existing base of 66,255 taps for a 14% increase within 2 years. Some of this production increase is likely due to producers buying or leasing maple groves from persons leaving the business.

Focus on Energy Eligibility

Producers were asked what utilities companies were serving their area for electricity and natural gas. Of the 56 respondents who provided their utility company names, 34 are in areas with utilities participating in the Focus on Energy program. However, because of the choice of wood and fuel oil for evaporation, only one respondent, who is using natural gas, would qualify for any grant programs. That producer is already using an economizer to reduce energy use but might also benefit from a reverse osmosis unit.

Summary

- Those producers purchasing non-wood fuels are more likely to invest in energy conservation and labor saving equipment than producers burning wood.

- At least 20% of the wood-burning respondents would be considered hobbyists producing less than 25 gallons per season, although it is hard to know at what production level to call it a hobby and when to call it a business because it is not a full time business for most producers.
- The efficiency of wood-burning evaporators is low (assuming data reported was accurate) averaging 2,100,000 BTU/ gallon of syrup versus 331,000 for non-wood fueled evaporators.
- Improving wood-fired evaporators would improve profits for producers and reduce emissions to the atmosphere.

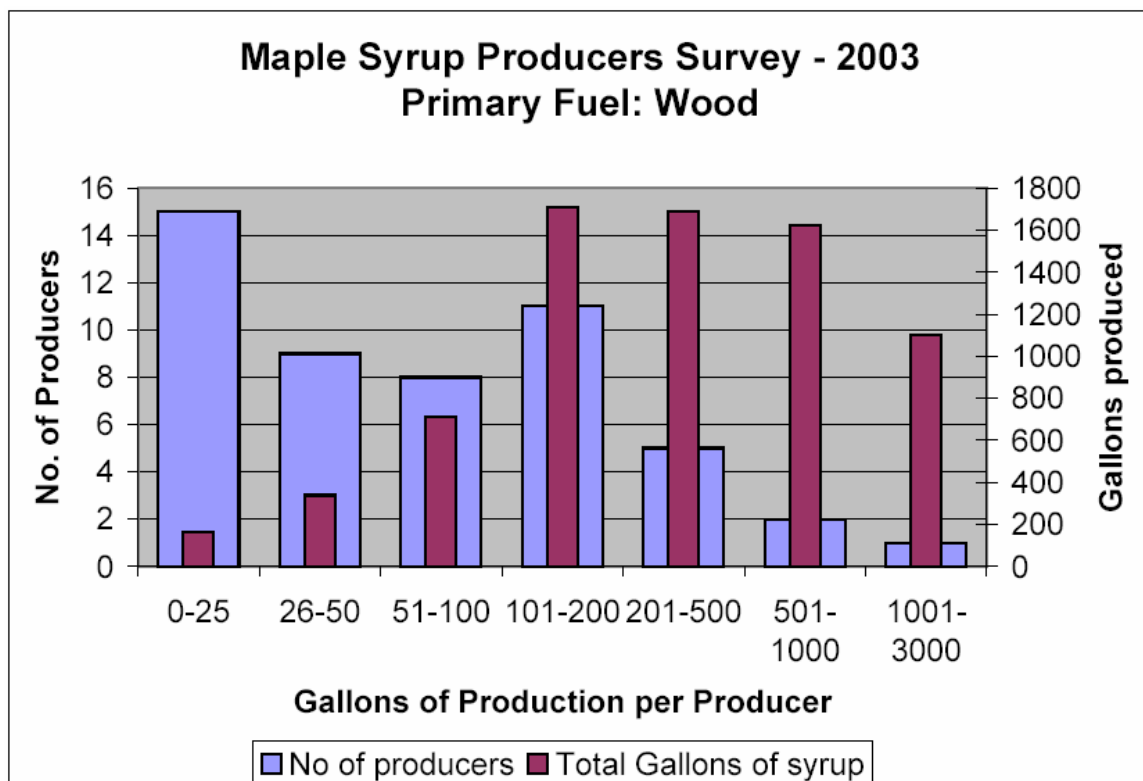


Figure 1

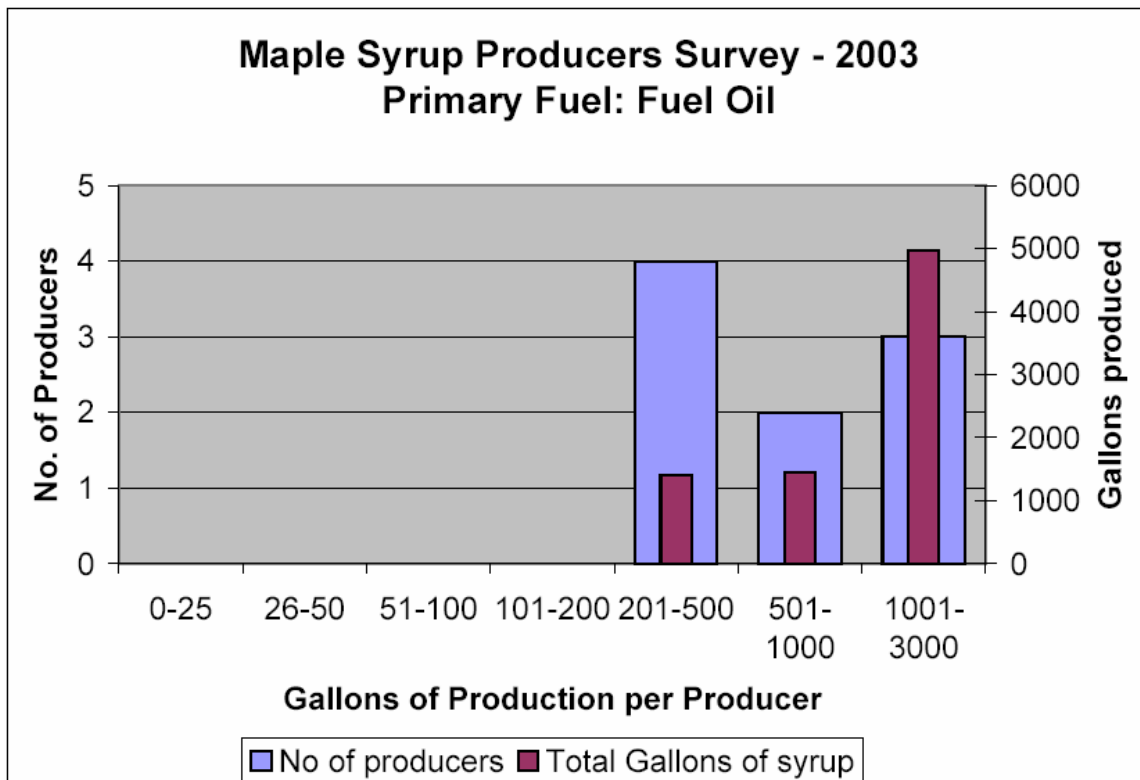


Figure 2

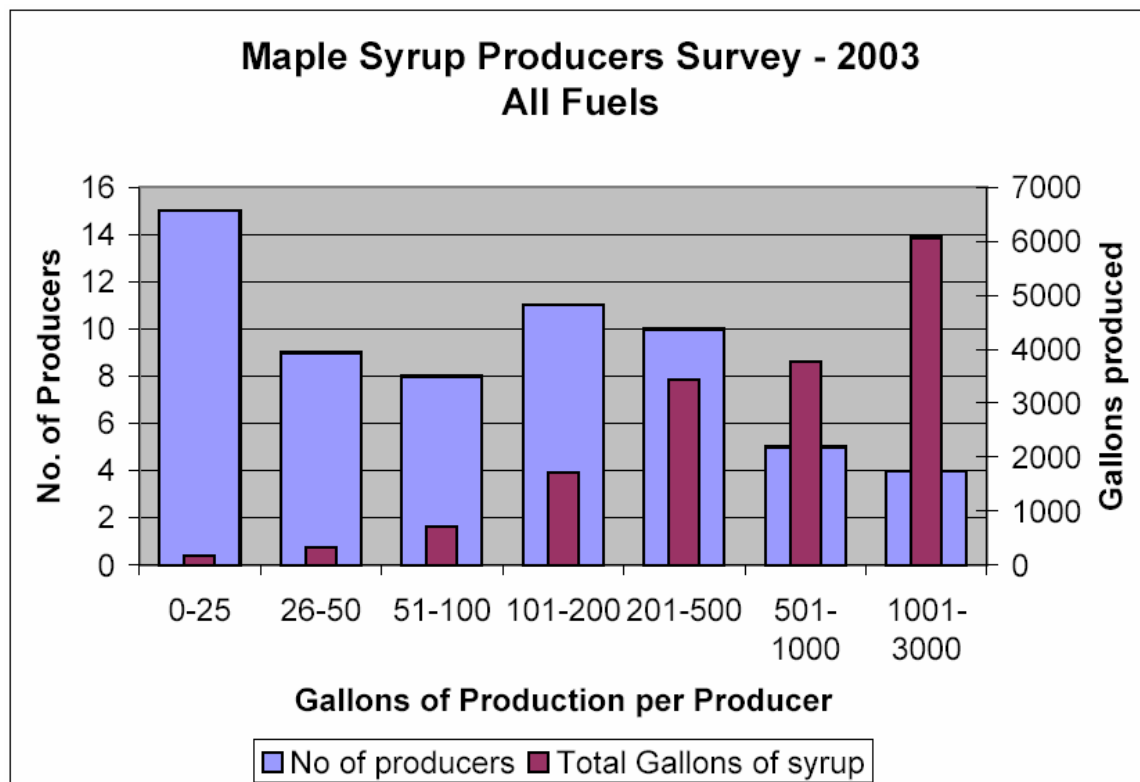


Figure 3

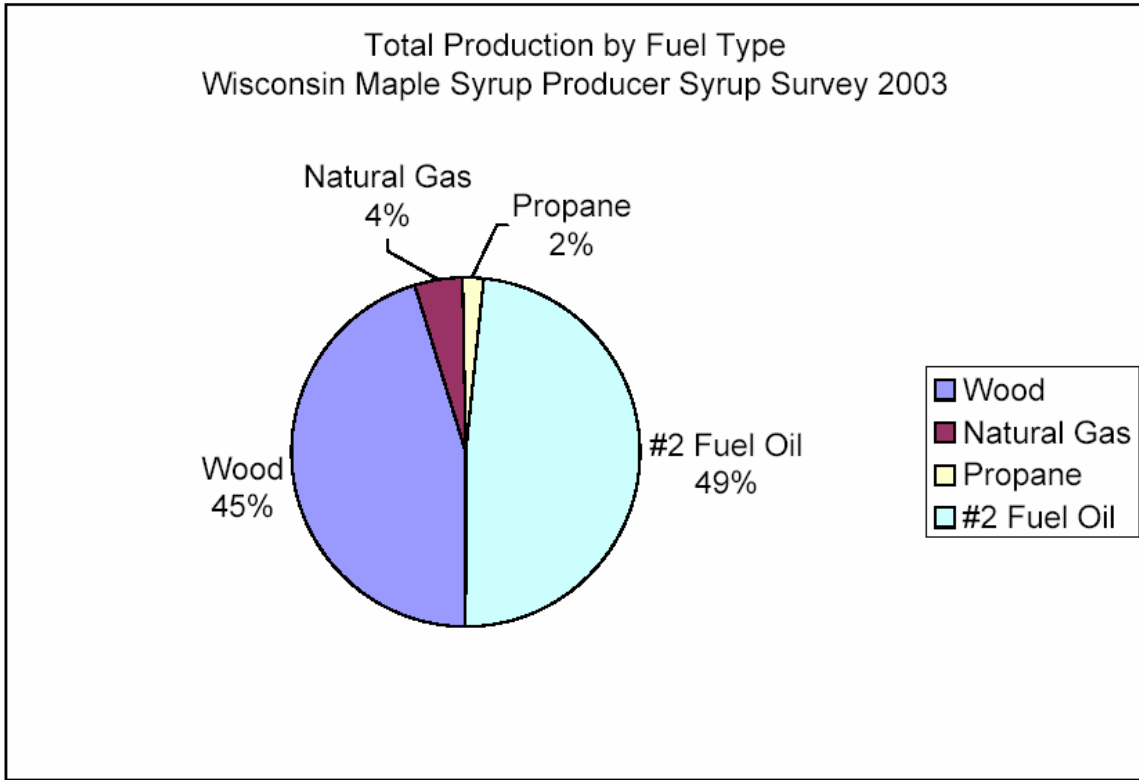


Figure 4

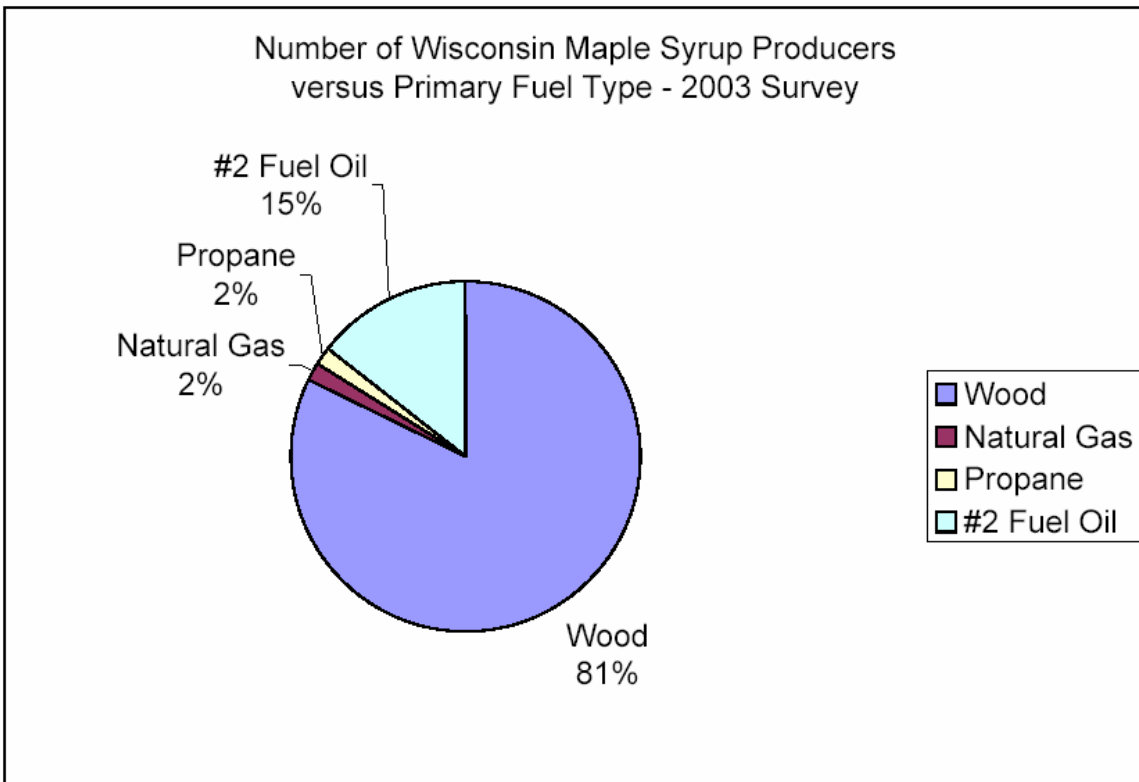


Figure 5