Preliminary Walnut Wood Staining Pattern:

Like in maples, tapping a walnut tree creates staining within the sap wood of the tree. In maples, this staining tends to spread to a volume of seventy-five times the size of the original tap hole (van den Berg & Perkins, 2012). Dr. Abby van den Berg was able to use these findings to calculate a sustainable tapping rate for maple trees. The stained, scared wood does not produce sap when tapped, maintaining a healthy tapping rate will ensure sustainable sap production every year. As the walnut syrup industry grows, a sustainable tapping rate will need to be found specifically for walnut trees.

Using similar methodology to the scaring studies in maple, two walnut trees with three tap holes were dissected, revealing the scaring pattern. Precise measurements were taken to estimate the volume of the stained/scared wood. Though this is a fairly accurate, the research team strove to better estimate the stained area of tap holes by dissecting with a sawmill rather than in cross section. To do so, two mathematical models were created to geometrical represent the stained area, the ellipsoidal model and double conical model. Upon several trials of the model, the double cone model appeared more accurate.

Ellipsoidal Model: $V(\propto) = volume\ of\ damage = \frac{4}{3}\pi abc$

a = full length of damage
b = depth of tap hole
c = full width of damage

Double Conical Model: $V(\propto) = volume\ of\ damage = 2(\frac{1}{3}abc)$

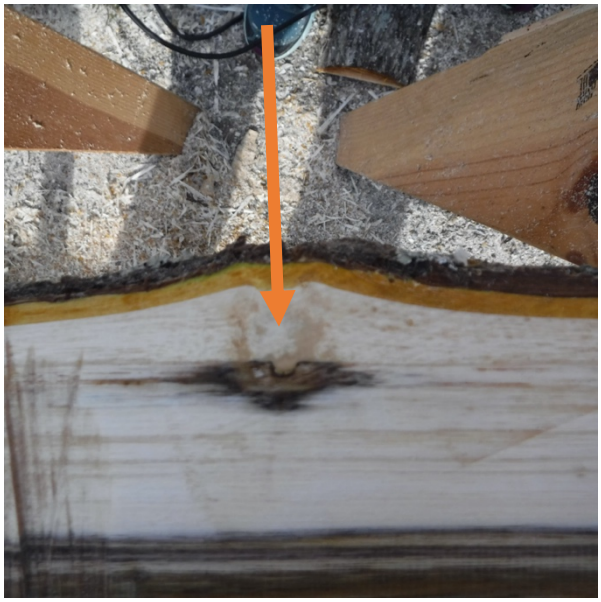
a= half of total damage height
b = depth of tap hole
c= width of damage

Though this study is still in its infancy, the initial findings suggest that walnuts produce less scar tissue than maples. Walnuts produce around eight times the volume of the tap hole in scar tissue. The implications of this are that smaller walnut trees can be tapped and walnut trees can be more aggressively tapped, while maintaining enough healthy sap wood to avoid tapping stained wood when following a basic tapping pattern. Future Generations University plans to continue this study as trees become available for dissection.

Preliminary Data:

Tap Hole (7/16ths)	Depth (in)	Staining (in^3)
1	**2**	**4.2**
2	**1.5**	**9.5**
3	**1.5**	**7.7**
Average	**1.7**	**7.1**

On inch of new growth over a one-year old tap hole



Nine years of rapid sapwood growth and non-conductive heartwood

Dissecting a walnut log to evaluate taphole staining

Longitudinal cut showing black staining around a taphole

One year old tap hole

Citations:

Van den Berg, Abby and Timothy Perkins. (2014) “A Model of the Tapping Zone.” Accessed: December 4, 2020. https://mapleresearch.org/pub/tapzonemodel-2-2-2-2/