**Sugar Maple –** *Acer saccharum*

| *Climate* | | | | | | | | *Soil* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min Optimal Temp (°F)** | **Max Optimal Temp (°F)** | **Min Absolute Temp (°F)** | **Max Absolute Temp (°F)** | **Growing Degree Days (__°F base)** | **Chilling Hours (32-45 °F)** | **Min Rainfall (in/year)** | **Max Rainfall (in/year)** | **Min pH** | **Max pH** | **Optimal Soil Texture** | **Absolute Soil Texture** | **Optimal Soil Drainage** | **Absolute Soil Drainage** | **Soil Depth (in)** |
| -40 [b, c, k] | 80 [b] | -49 [b, c, k] | 100 [b] | N/A | N/A | 30 [b, c, k] | N/A | 3.7 [b, c, k] | 7.9 [b, c, k] | loam, silt loam, sandy loam, loamy sand, sand [c, f, k] | clay, sandy clay, silty clay, clay loam, silty clay loam, sandy clay loam, silt [c, f, k] | well drained [a, b, c] | somewhat excessively drained, moderately well drained, somewhat poorly drained [a, b, c] | 39 [b, e, k] |

| | *Key Months for Crop Development and Thresholds* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DEC** | **JAN** | **FEB** | **MAR** | **APR** | **MAY** | **JUN** | **JUL** | **AUG** | **SEP** | **OCT** | **NOV** |
| **Stage of growth** *(under current conditions)* | Dormant | Dormant[j] | Dormant, Sap Flow [b, j] | Dormant, Sap Flow [b, j] | Dormant, Sap Flow, Flowering [b, j] | Flowering, Budbreak [b, j] | Vegetative Growth [b, j] | Vegetative Growth [b, j] | Vegetative Growth [b, j] | Samara Drop [b, j] | Leaf Drop [b, j] | Dormant [b, j] |

Key Cultivars:

Climate Risk Notes: [d, g, h, i]

Sugar maple is extremely cold hardy and is reported to withstand winter temperatures as low as -40°F. In Wisconsin, the highest densities of sugar maple can be found in the Driftless region in the southwest and the north and western portion of the state. With climate change, this range is expected to shift northward in the next century, and the southwestern populations of sugar maple are expected to decline.

Climate variability is also expected to shift the season for sap collection earlier in the year. Some projections show that the sap season could start a month earlier by the end of the century.

Finally, warming temperatures will allow sugar maple trees to have a longer growing season and consume more of the sugar produced. This is projected to lead to reduced sugar concentrations in sap.

## *References*


[a] Arbor Day Foundation (n.d.). *Sugar Maple Tree - Acer saccharum*. https://www.arborday.org/trees/treeguide/treedetail.cfm?itemID=870

[b] Godman, R. M., Yawney, H. W., & Tubbs, C. H. (1990, December 1). Silvics of North America. U.S. Department of Agriculture Forest Service. https://research.fs.usda.gov/silvics/sugar-maple

[c] Illinois State Water Survey. (2021, March 15). *Acer Saccarum subsp. saccarum.* Alternative Crop Suitability Maps. https://www.isws.illinois.edu/data/altcrops/cropreq.asp?crop=18&fp=croplist&letter=S&nmeType=cmn

[d] Matthews, S. N., & Iverson, L. R. (2017). Managing for delicious ecosystem service under climate change: can United States sugar maple (Acer saccharum) syrup production be maintained in a warming climate?. *International Journal of Biodiversity Science, Ecosystem Services & Management*, *13*(2), 40-52.

[e] McIsaac, D. (2012). *Characteristics of a Good Sugar Maple Stand.* Perennia. https://www.perennia.ca/wp-content/uploads/2021/06/Characteristics-of-a-Good-Maple-Stand.pdf

[f] Myrdal, C. (2021, January 28). *Plant Profile: Sugar Maple (Acer saccharum)*. Network of Nature. https://can-plant.ca/blog/plant-profile-sugar-maple-acer-saccharum.htm

[g] Rapp, J. M., Lutz, D. A., Huish, R. D., Dufour, B., Ahmed, S., Morelli, T. L., & Stinson, K. A. (2019). Finding the sweet spot: Shifting optimal climate for maple syrup production in North America. *Forest Ecology and Management*, *448*, 187-197.

[h] Skinner, C. B., DeGaetano, A. T., & Chabot, B. F. (2010). Implications of twenty-first century climate change on Northeastern United States maple syrup production: impacts and adaptations. *Climatic change*, *100*(3), 685-702.

[i] Solin, J. J. (2022, July 29). *Maple Syrup and Climate Change.* University of Wisconsin-Madison Maple Syrup Program Division of Extension. https://maple.extension.wisc.edu/2022/07/29/maple-syrup-and-climate-change/

[j] U.S. Department of Agriculture Forest Service. (n.d.). *Species: Acer Saccharum.* Fire Effects Information System (FEIS). https://www.fs.usda.gov/database/feis/plants/tree/acesac/all.html#:~:text=Increases%20in%20die%2Dback%20have,controlling%20sugar%20maple%20%5B25%5D.

[k] U.S. Department of Agriculture Natural Resources Conservation Service. (n.d.). *Acer Saccarum Marshall*. PLANTS Database. https://plants.sc.egov.usda.gov/plant-profile/ACSA3