

Who am I?



- Small commercial maple producer (3400 taps)
- Former maple equipment dealer & vegetable farmer
- Executive Director of the Ontario Maple Syrup Producers' Association
- BSc in Physical Geography - Geomorphology (Soils, glaciation, etc)

Who I am not!

- Forester
- A forest health expert

My perspective, what's yours?

- Summation of what I have learned through the years
- Viewed through the lens of my needs, bush etc.
- Learn what works for your needs
- Find professionals, mentors that understand your needs.



What makes a good Sugar Bush?

As a lens for Sugar Bush Health

By John Williams



What makes a good Sugar Bush vs. Forest Health

- Approach the Sugar Bush as a whole instead of just Forest Health
- Relate good Sugar Bush practices to Forest Health

- Most of us don't have the perfect Sugar Bush, but we can take steps to improve it and improve its health
- Recognize where the problems could be and fix if possible

Bush size or tap count

- Yes, size matters - big enough to be economic (20 + acres?) or meet your particular goals
- Easier to manage the removal of desired (usually large) trees without affecting sap yield in larger bushes
- Means it is easier to create uneven aged bush, better overall health



Photo: John Williams

Terrain

Can't change, but affects health

Aspect

Slope

Drainage

Soil

Terrain

Aspect

- North
- South
- East
- West

Generally, a southern exposure has been preferred. Warms better in the daytime. Climate change may shift this, north to reduce daytime heating. May also allow for more moisture in the soil during the spring, summer and fall. Better for tree seed germination and sapling growth. Less moisture stress on larger trees.

Slope

- For tubing
 - 5 to 10% perfect
 - <5% - work to create slope in lines
 - shorten distance between mainlines
 - Tap higher on tree
- Buckets
 - <5% easier to collect from buckets
 - Less erosion on roads

Slopes above 10% makes movement through the bush more difficult: harder to follow proper forest management, less bush health.

Terrain

Drainage

- Need good drainage, Sugar Maple often grow on gravel
- Can improve with ditching, improves root health
- Heavy (clay) soils or bedrock at or near the surface can create rough terrain (and poor drainage) with lots of valleys, harder to run lines

Soil

- Loamy, lots of organic matter
- Good calcium (around neutral pH)
- Can add lime or wood ash to improve a low pH soil

Roads & Access

- Need enough roads for :
 - Tours
 - Repairs
 - Exercise
 - Logging
- Use of the same areas keeps tree damage and compaction restricted to a limited area.
- Can be harmful by bringing access for invasive species like garlic mustard, and buckthorn
- Can affect drainage

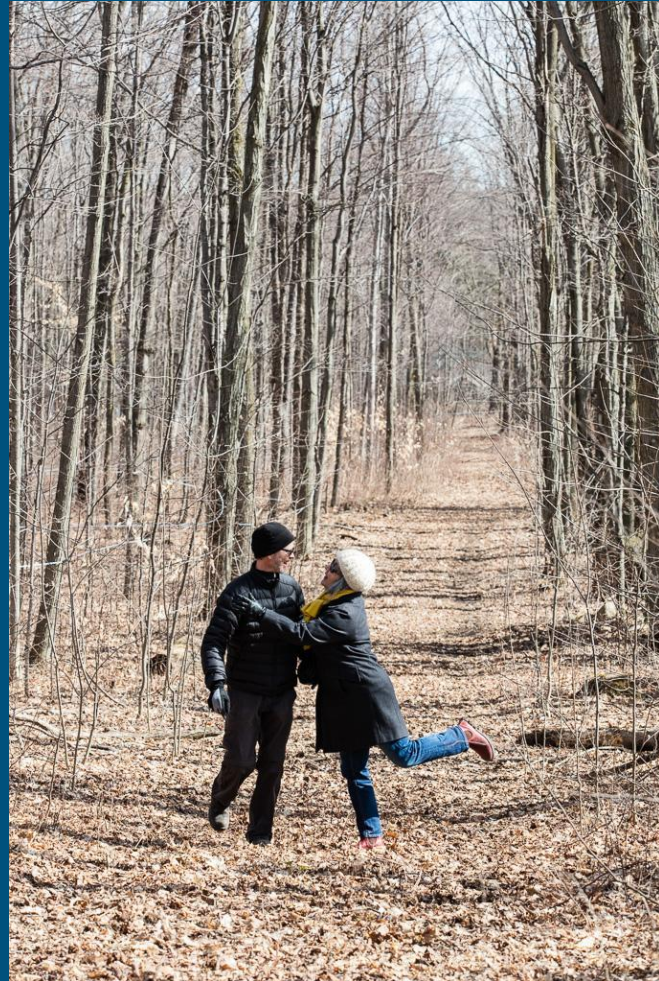


Photo: David Barker

Forest Management



Photo: John Williams

Mix of species

Maturity and age distribution

Density

Understory Management

Mast & Cavity Trees

Diseased Trees

Invasive Plant Species



Forest Management

Mix of Species

- Up to 25% of red oak, basswood, black cherry, yellow birch, white pine, hemlock, poplar
- Lost - Beech and ash
- Helps alleviate pest and disease pressure
- Hosts for other animals and insects
- Income from saw logs

Maturity & Age distribution

- Even aged stands
 - Caused by grazing, fire, clear cutting, afforestation, storms
 - Encourage age diversity to have a continuing supply of trees as trees are damaged or age
- Old even aged stands
 - Difficult to rejuvenate
 - Reduced sap flow and taps as trees decline all at once

Forest Management

Density

- Usually measured as basal area
 - Trunk cross-section area per h or acre
 - 19 m²/ha considered optimal
- Overstocked bushes
 - More likely to have: weak trees, lower sugar content, wind damage, disease
- Understocked bushes
 - More problems with maple borer, wind damage, invasive plant species
- Producers often reluctant to cut maples



Photo: John Williams

Understory management

- Many feel the need to “clean up” the bush
 - No decaying tops or logs,
 - Many saplings cut to allow easier movement
- Leave a variety of brush and small trees
 - Better biodiversity, homes for animals, insects
- Decaying logs and tops on bush floor
 - Promotes Mycorrhizae,
 - Better health and nutrient uptake

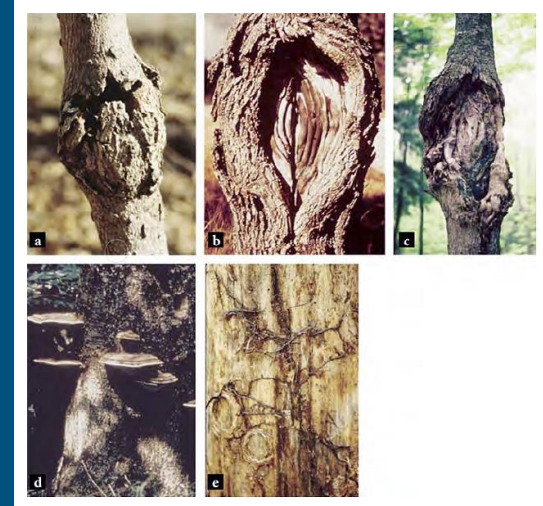
Forest Management

Mast & Cavity Trees

- Habitat for animal life
 - Nesting
 - Food source
- Some may avoid this to reduce pest problems - ie squirrels



Photo: John Williams



Removal of Diseased Trees

- Cut out trees with:
 - Eutypella (cobra head) canker
 - Nectria (target, bullseye) canker
 - Armillaria (rot root)
 - Conk
- Removal reduces presence of spores
- Cut stumps close to ground to stop spread of Armillaria

Picture above: NA Maple Producers Manual 3rd ed.

Forest Management

Invasive Plant Species

Displace native species that are woven into the ecology of the sugar bush

- Prevent germination and growth of tree saplings and other natives on bush floor
- Can suppress root growth, nutrient uptake, and soil life
- Garlic Mustard, Buckthorn are problems for us
- Others: bush honeysuckle, autumn olive, barberry, swallow wart
- Develop a management strategy: for G. Mustard I walk the bush mid May every year collecting plants, check disturbed areas



Photo: John Williams

Damaging Insects

Defoliators

- Forest tent caterpillar
- Spongy (Gypsy) Moth
 - Saddle Prominent
 - Bruce Spanworm
 - Fall cankerworm
 - Pear thrips
 - Lecanium Scale
 - Spotted lantern fly

Sugar Maple Borer



Adult



Larva

Borers

- Maple Borer
- Asian Longhorn Beetle
- Emerald Ash borer

From Guide to Improving..., see last page for reference

Maintaining a healthy, diverse sugar bush will help reduce outbreaks and prevent devastation in many cases.

Sometimes intervention (spraying) may be necessary to prevent undo stress and decline of the bush. Invasives like ALB must be fought with all measures.

Maple production related issues

Salt from roads

- Expect dieback in areas close to roads
- Be Careful when clearing snow
 - Don't push salty snow into the bush

Firewood

- Avoid bringing in firewood from out of area
 - Asian Longhorn, spotted lantern fly
 - Oak wilt, hemlock woolly adelgid

Anchoring lines

- Lags
 - Prevent choking of tree
- Tubing over wire
 - Spreads load
 - Needs to be moved to prevent damage



Maple Production related issues

Tapping

- Use health spiles (5/16", 19/64", 1/4")
- Proper movement of tap holes around the tree, hitting old comp. wood
- Over driving taps - split bark
- Tap warmer than - 5 C if possible to avoid split cambium
- Over tapping trees - follow guidelines
- Freshening holes in late season
- Proper and sharp bit, no cleaners
- Tool for removal of taps - less bark damage
- Remove taps before cleaning solution pumped.

Characteristics Of a Healthy & Productive Sugar Bush

Table 24: Biological Characteristics

	Ideal	Acceptable	Less Desirable
Past Management History	<ul style="list-style-type: none"> Sugar bush historically managed with the methods described in this manual All-aged stand structure 	<ul style="list-style-type: none"> Even-aged stand structure 	<ul style="list-style-type: none"> Cattle grazing High grading Rutting Soil compaction Poor tapping practices Mechanical damage to trees
Species Composition	<ul style="list-style-type: none"> 75% or more Sugar and Black Maple; Good representation of the other species in the woodlot 	<ul style="list-style-type: none"> >25% canopy trees are Sugar or Black Maple 	<ul style="list-style-type: none"> Large proportions of Red and Silver Maple Maple is only a minor component of the forest
Tree Health	<ul style="list-style-type: none"> 16 m²/ha or more healthy trees (AGS) 80% AGS trees with large healthy crowns and little stem defect Taphole closure < 2 years 	<ul style="list-style-type: none"> 9 to 16 m²/ha AGS trees 	<ul style="list-style-type: none"> < 9 m²/ha AGS trees < 45% of AGS have small crowns or dieback Abundant defect Taphole closure >3yrs
Number of Taps	<ul style="list-style-type: none"> At least 150/ha (60/acre) Abundant polewood Sugar and Black Maple (future crop trees) 	<ul style="list-style-type: none"> <150 but >100/ha (<60 but >40/acre) 	<ul style="list-style-type: none"> <100/ha (<40 per acre) Little polewood Sugar or Black Maple
Regeneration	<ul style="list-style-type: none"> Abundant Sugar and Black Maple; > 5000 seedlings/ha (2000/acre) in mature stands Healthy representation of other species 		<ul style="list-style-type: none"> Little Sugar or Black Maple regeneration Abundant other species Abundant invasive species
Sap Sweetness	<ul style="list-style-type: none"> ≥ 3% 	<ul style="list-style-type: none"> < 3 but ≥ 1.5% 	<ul style="list-style-type: none"> <1.5%

Table 25: Physical Characteristics

	Ideal	Acceptable	Less Desirable
Location	<ul style="list-style-type: none"> Close to markets Existing hydro or readily available 		<ul style="list-style-type: none"> Remote from major markets Hydro difficult to access
Site	<ul style="list-style-type: none"> Gentle slopes leading to a central location 	<ul style="list-style-type: none"> No slope at all 	<ul style="list-style-type: none"> Erratic slopes
Soil	<ul style="list-style-type: none"> Well drained Loamy Fertile pH between 5.5 and 7.5 		<ul style="list-style-type: none"> Rapidly or poorly drained Coarse sandy soils Clay soils Infertile Strongly acidic or alkaline
Accessibility	<ul style="list-style-type: none"> Good network of forest access roads Easily accessed from plowed roads 		<ul style="list-style-type: none"> Poor access in winter No forest access roads

The End!



Photo: David Barker

Major source: **Chapeskie, et al, 2006. *A Guide to Improving and Maintaining Sugar Bush Health and Productivity*, Ontario Eastern Model Forest, Kemptville, ON.**