

# A Primer on Seasonal Pine Tree Bonsai Care

*My goal tonight is to give a brief overview of seasonal Pine tree care for Bonsai in the SF Bay Area, show some photos of buds, candles and bark, show some representative Pine Bonsai, and to inspire you to appreciate Pines as Bonsai.*

*I would like to de-mystify pine tree de-candling*

*Michael Greenstein, September 2020*

# Outline of the Talk on Pine Tree Care

- Inspiration
- Background
- Classification
- Fun Facts and General Care
- Needle Biology
- Concepts of flush, fuses and de-candling
- Black Pine, Cork Black Pine, White Pine details
- Bonus Tip 1 & Bonus Tip 2

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(Demystifying  
hopefully  
happens here)

# Japanese White Pine Bonsai Inspiration: 1625



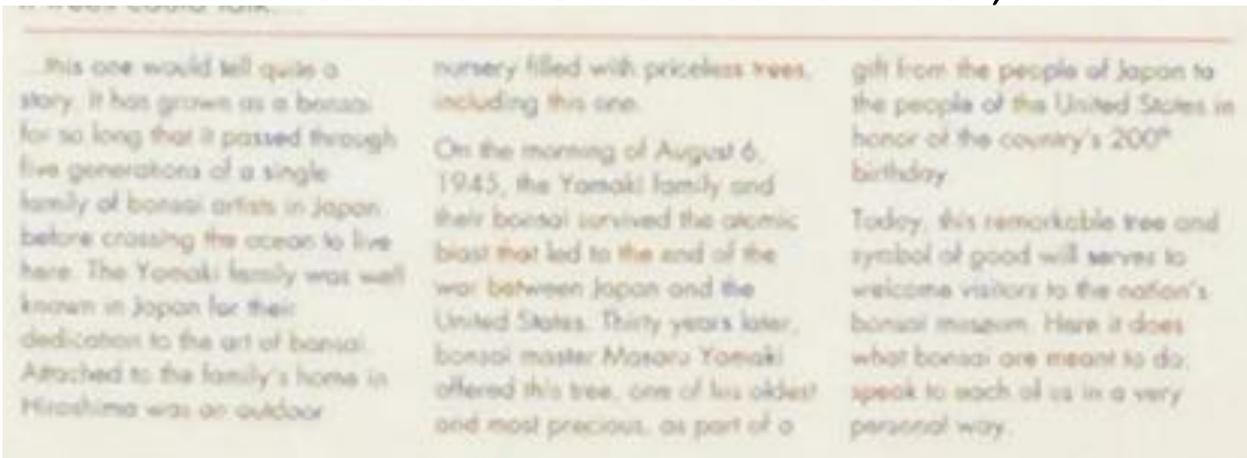
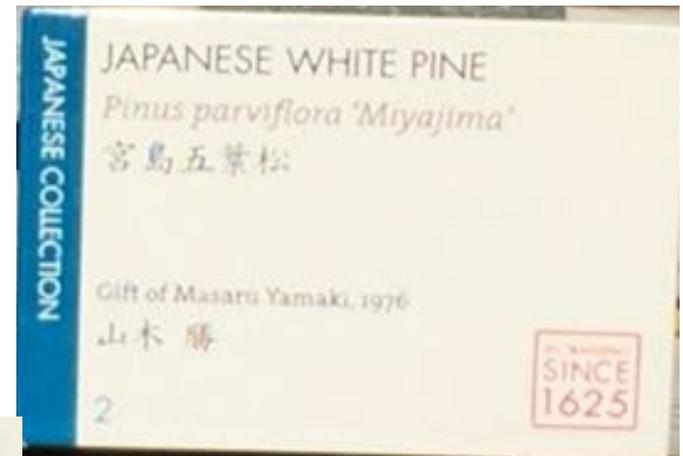
For scale, the wooden platform is 4 x 4 foot



*(2020 – 1625 = 395 years old!)*

# Japanese White Pine Bonsai Inspiration

- White Pine cultivated since 1625
- 5 generations of bonsai masters in one family
- In a garden in Hiroshima in 1945, and it survived
- Offered in 1976 as a peace gift to US by the family
- You can see this tree in the US Collection, in WDC

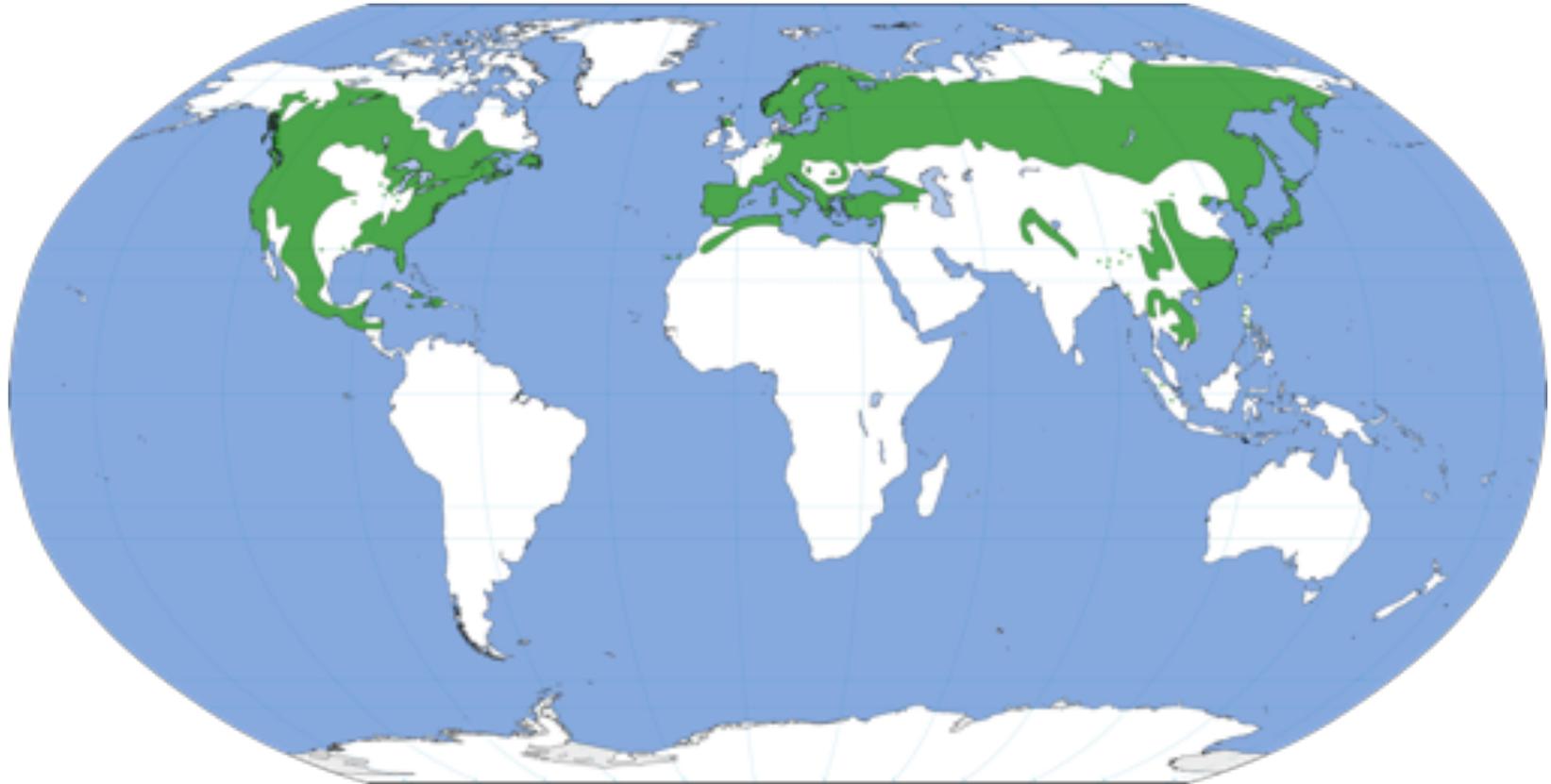


(2020 – 1625 = 395 years old!)

## Pine Tree Introduction / Overview

- *Pinus*, with over 100 species, is the largest genus of conifers and the most widespread genus of trees in the Northern Hemisphere.
- The natural distribution of pines ranges from arctic and subarctic regions of Eurasia and North America south to subtropical and tropical (usually montane) regions of Central America and Asia.
- Graphically...

# Pinus World-wide Range



# Pine Tree Classification (1)

- ***Phylogenetically***: sequence the genome, classify by similarity
- ***Hard / soft*** wood
- ***Numbers of needles*** in a sheath
  - 2: Bishop, Japanese Black, Lodgepole, Japanese Red, Scots
  - 3: Jeffreys, Monterrey, Pitch, Ponderosa
  - 4: Pinyon
  - 5: Bristlecone, Japanese White, Western White
  - 6: ?
  - 7: ?

## Pine Tree Classification (2)

- Most classifications of *Pinus* recognize two major lineages, consistent with data from wood anatomy and secondary chemistry, and is supported by recent molecular phylogenetic studies:
  - **subgenus *Pinus*** (identified as hard pines)
  - **subgenus *Strobus*** (identified as soft pines)

# Pine Family Organization: CA/Bonsai Examples

Subgenus (3)	Section (5)	Needles	Common / Familiar Examples
<b>Pinus (hard)</b>	<b>Pinus</b>	2	Japanese Black, Mountain, Japanese Red, Scots, Mugo
	<b>Pinea (2 subsections)</b>	2	Aleppo, Stone
	<b>Trifoliae (5 subsections)</b>	3	Bishop, Jeffrey, Lodgepole, Monterey, Pitch, Ponderosa
<b>Strobus (soft)</b>	<b>Quinquefoliae (2 subsections)</b>	5	Japanese White, Western White
<b>Ducampopinus</b>	<b>Parrya (6 subsections)</b>	5	Bristlecone, Pinyon

# Categorizing Pines by “Hard/Soft”: US Examples

## Hard Pines

- bishop pine (*Pinus muricata*).
- Coulter (or "big cone") pine (*Pinus coulteri*).
- gray (or "foothill" or "Digger") pine (*Pinus sabiniana*).
- Jeffrey pine (*Pinus jeffreyi*).
- knobcone pine (*Pinus attenuata*).
- lodgepole pine (*Pinus contorta*). \*
- Monterey pine (*Pinus radiata*). \*
- ponderosa pine (*Pinus ponderosa*). \*
- Torrey pine (*Pinus torreyana*).

## Subgenus **Pinus**

## Soft Pines

- (Great Basin) bristlecone pine (*Pinus longaeva*).\*
- foxtail pine (*Pinus balfouriana*).
- limber pine (*Pinus flexilis*).
- nut pine or parry pinyon (*Pinus quadrifolia*).
- singleleaf pinyon pine (*Pinus monophylla*).
- sugar pine (*Pinus lambertiana*).
- western white pine (*Pinus monticola*). \*
- whitebark pine (*Pinus albicaulis*).

## Subgenus **Strobus**

\* Some common US bonsai material

# Pine Tree Fun Facts

- *Pinus* is the largest genus of the [Pinaceae](#), the pine family, which is the oldest and largest conifer family.
- Conifers evolved about 300 M years ago, and pines about 153 M years ago.
- The genus *Pinus* is thought to have diverged from other pine-like trees about 95 million years ago.
- Pines are prone to inter-species breeding (hybridization).
- Pine needles can stay on the tree between 1.5 and 40 years!

# General Pine Care

- Pines like
  - **Full sun**: as much as your water conditions allow
  - **Rapid draining soil**: high sand or lava content, minimal humas
  - **Lots of mycorrhiza**: inoculate from old soil or other pines
- To get the best out of your pines, follow a regular schedule of
  - Fertilizing
  - De-Candling work
  - Needle work (removal + thinning)
  - Red Spider mite spraying (pesticide + overhead water)

# Pine Tree Spraying

I like:

Bioadvanced

Insect, Disease & Mite Control

*(I get it at Summer winds,  
Use 2x per season: spring & fall  
Use a mask; it irritates my throat  
if I spray the whole garden with  
hose-end version)*



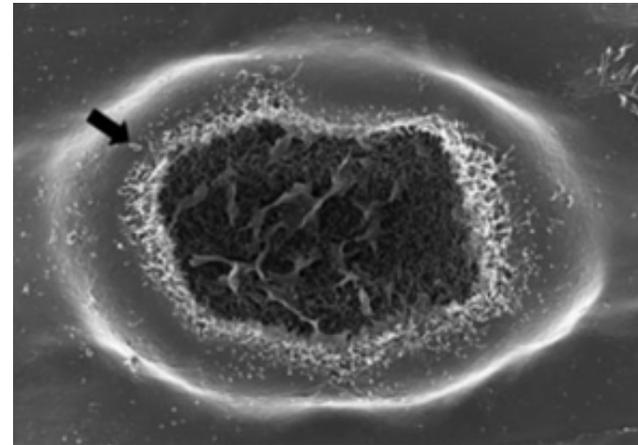
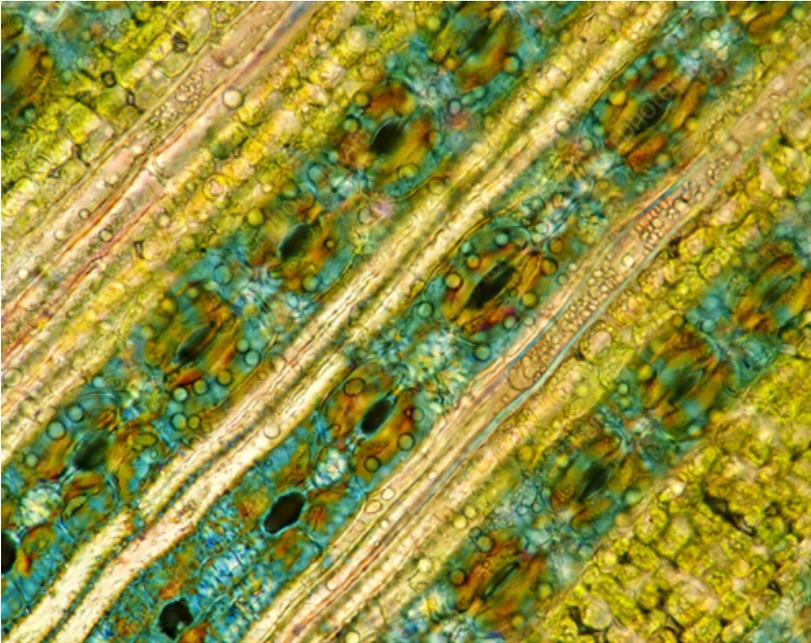
Insecticide, Fungicide & Miticide

# Pine Needle Biology

- Narrow shape reduces the surface area for dehydration, and the waxy coating, or cuticle, provides a barrier to water loss
- The openings in leaves for gas exchange through which water also escapes, or transpires (stomata) are set within small pits to provide a “boundary layer” of still air
- In *Strobus* the “soft” or “white” pines, the stomata line one side of the needle (less transpiration).
- In *Pinus* the “hard” pines, stomata are found on both upper and lower surfaces of the needle (more transpiration).

# Pine Tree Stomata

Pores for transpiration (breathing)

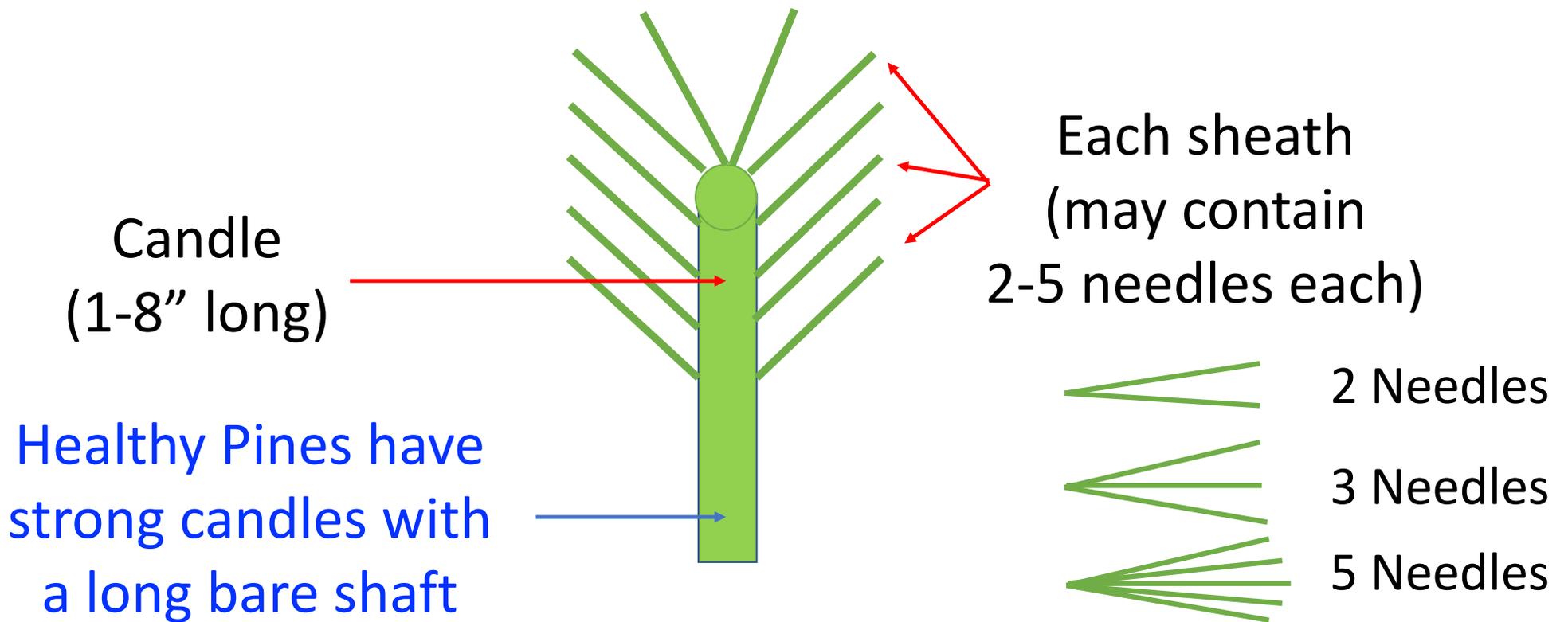


10-25 um in diameter

# Goals of Needle and Candle Work

- The goal of needle / candle work includes:
  - **Energy balance** (growth rate) : pines are top dominant
  - **Ramification** (including back budding) to fill out the tree
  - **Needle reduction**: reduce 6" needles to ~2"
- *This procedure is only for mature, healthy pines!*
  - Dark green, stiff needles, > 2" candles all over the tree
- Pines come in 2 broad categories (**flush**: growth spurt)
  - *Each category requires specific care!*

# Pine Structure Basics: Candles, Sheathes, Needles



## Single Flush: One growth spurt per season

- *Japanese white pine, Pinus parviflora*
- *Mugo pine, Pinus mugo*
- *Ponderosa pine, Pinus ponderosa*
- *Limber pine, Pinus flexilis*
- *Bristlecone pine, Pinus longaeva*
- *Foxtail pine, Pinus balfouriana*
- *Western white pine, Pinus monticola*
- *Shore pine/lodgepole pine, Pinus contorta*

*If you cut the candles of these trees, they cannot regrow candles in the season!*

*Based in part on information from Jonas Dupich*

## Multiple Flush: 2 -3 growth spurts per season

### ***Annually***

- Japanese black pine, *Pinus thunbergii*
- Japanese red pine, *Pinus densiflora*
- Pitch pine, *Pinus rigida*

*If you cut the candles of these trees, they can regrow candles in the season!*

### ***Occasionally*** (if very strong)

- Cork Bark Japanese black pine cultivars
- Dwarf Japanese black pine cultivars
- Monterey pine, *Pinus radiata*

*Based in part on information from Jonas Dupich*

## Second Flush: Non-Reliable

- Virginia pine, *Pinus virginiana*
- Scots pine, *Pinus sylvestris*
- Austrian black pine, *Pinus nigra*
- Aleppo pine, *Pinus halepensis*
- Italian stone pine, *Pinus pinea*
- Pinyon pine, multiple species

*If you cut the candles of these trees, they **might** regrow candles in the season, so be careful!*

*Based in part on information from Jonas Dupich*

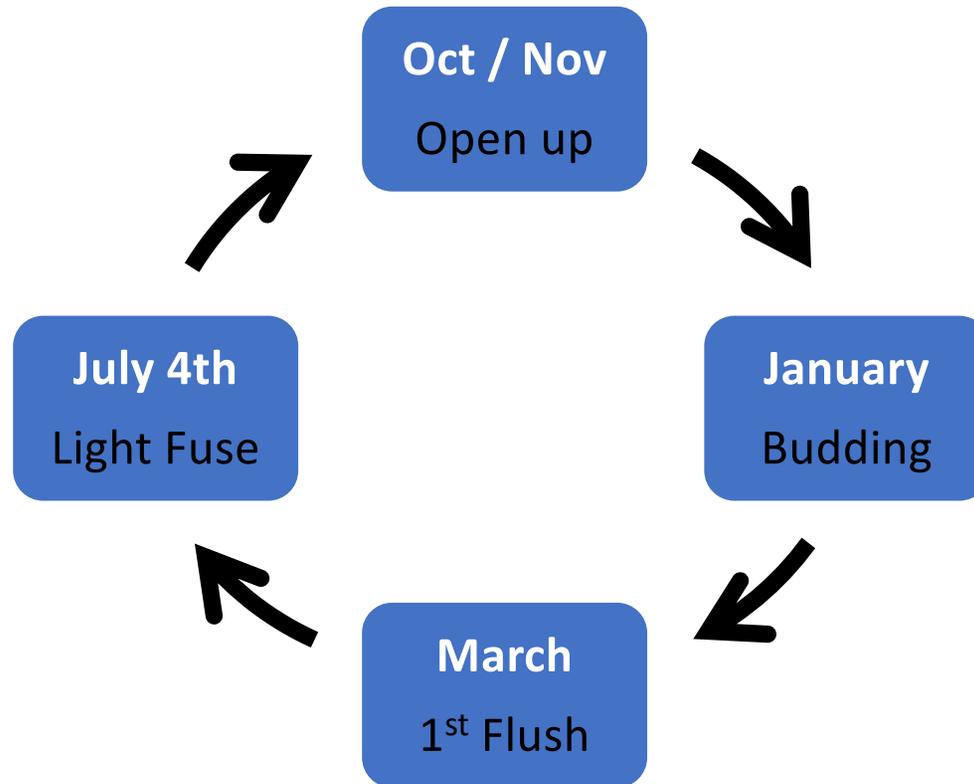
## Seasonal *Black Pine* Bonsai Candle Care

- I want to repeat: It is very important to apply the correct technique to the category of pine: *applying the multiple flush technique to a single flush pine could kill it.*
- Pine care can be divided into several activities, described here in terms of months in the SF Bay Area.
- *The technique described below is only for healthy Black pines; they should have dark, stiff needles, and multiple candles over 2 inches in length over most of the tree.*
- *If you are not sure about the health, better to wait*

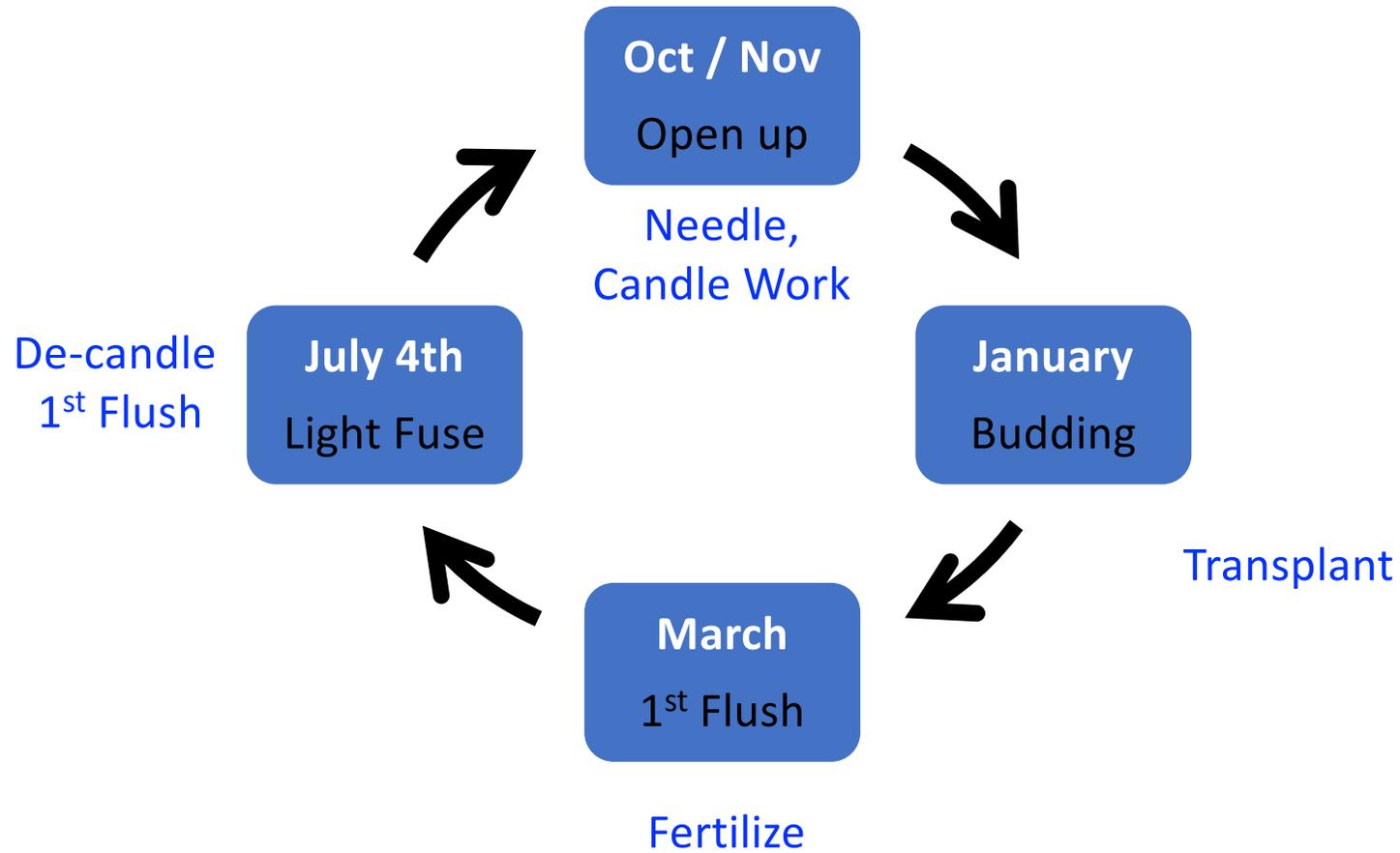
# 1-Step Black Pine Tree De-Candling Technique

- I was taught this technique by Kathy Shaner about 15-20 years ago in a class. She learned it in Japan from Mitsuya.
- Previously, in Japan, the practice was to use **3 de-candling steps** to get the individual candle timing optimized. It still works, but requires 3 steps, each a couple of weeks apart.
- This technique from Japan uses **1 de-candling step** and so is more efficient for those of us with limited time (or too many Black Pines, or a combination...)
- My only contribution was: visualize the candle as a *chemical fuse*

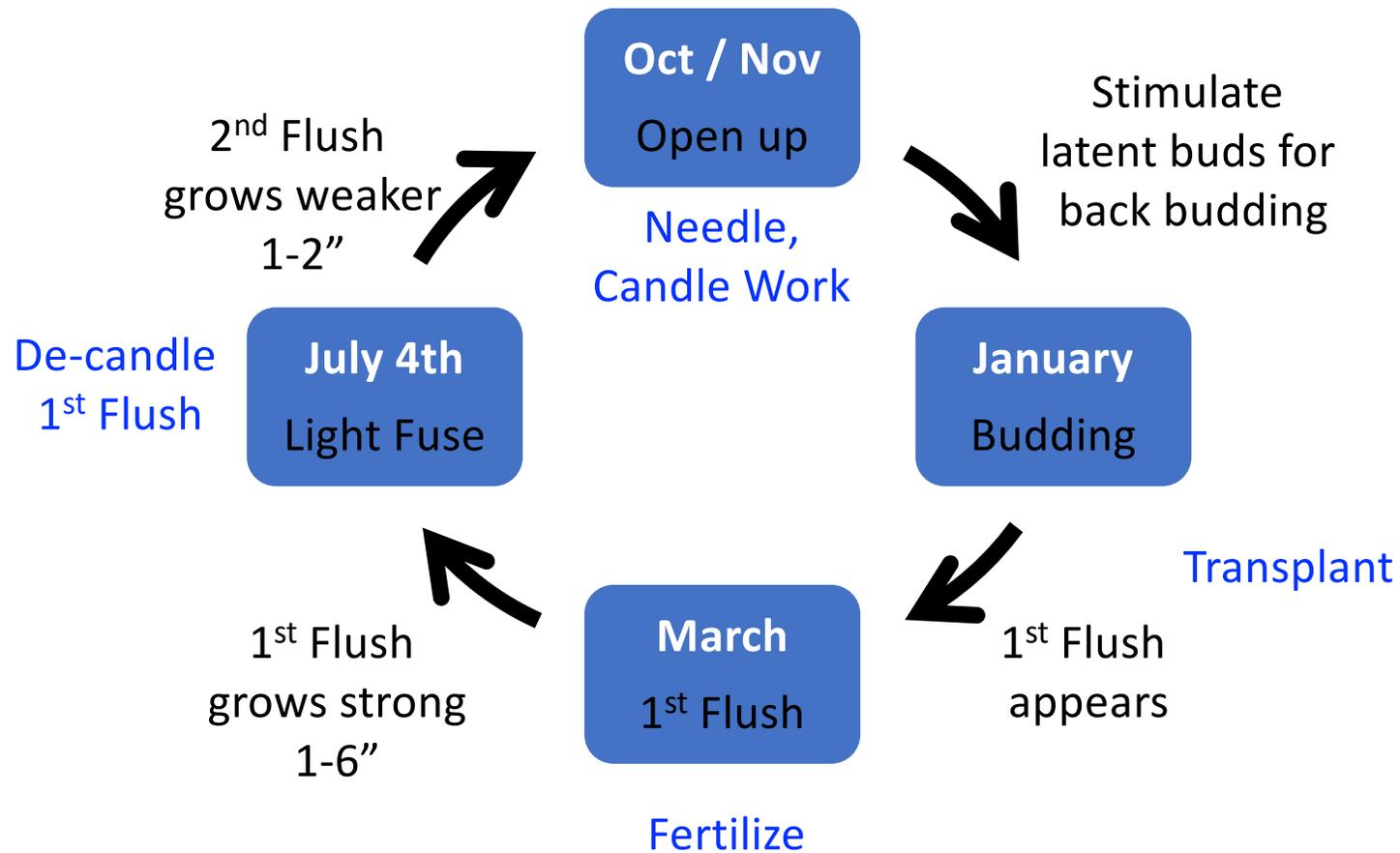
# Black Pine De-Candle Cycle (for SF Bay Area)



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# October-November (Open Up for Back Buds)

- Open up the tree for winter light to encourage back buds.
- Pines must be stimulated to back bud (not their natural inclination) to maintain their size, otherwise they will eventually grow too leggy. It is hard to get old pine branches to bud back
  - **Needle removal** (pulling or cutting at the sheath): pull all 2-3-year-old needles leaving only the current year needles
  - **Needle thinning** (pulling or cutting at the sheath): reduce the number of needles on the top of the tree to balance the energy; A typical pattern is 5 pairs @ top, 7 pairs @ middle, 9 pairs @ bottom. *This can be modified to suit the health condition of the tree; these are only guidelines (also: 3/5/7)*
  - **Candle stubs**: remove dead candles stubs (old fuses) from July *with sharp pointed scissors to minimize length of residual stub (image later)*

## March-July (1<sup>st</sup> Flush Grows Strong)

- Fertilize strongly and *let most candles grow wild*.
- Really strong candles at the top (where there is the most sun) can be broken off at the 3-4-inch length to balance energy to other candles below.
- A 6-inch candle on the lower part of the tree is OK (don't worry, your tree is happy!) as it builds power and will be totally removed later. See example on later slide.

## July (4<sup>th</sup>: think about lighting a fuse) (1)

- *De-candle the entire tree.* The idea is to cut off most of the new candle to force a second flush of candles at the base of this year's growth. This allows us to rebalance the energy and enables the cutting to happen in one step (session): *we vary the length of the candle stub as a timing fuse.*
- *The remaining candle stub acts as a chemical fuse.* The longer the candle stub is, the longer it takes the chemical injury-response signal to get to the base to initiate second flush growth. The sooner the second flush starts the stronger these candles will be.
- On a healthy pine the second flush can have 6-8 new candles; eventually we will only keep 2 second flush candles in a horizontal plane (in October).  
*(In Japan they can get 10-12 second candles on a really strong, healthy tree!)*

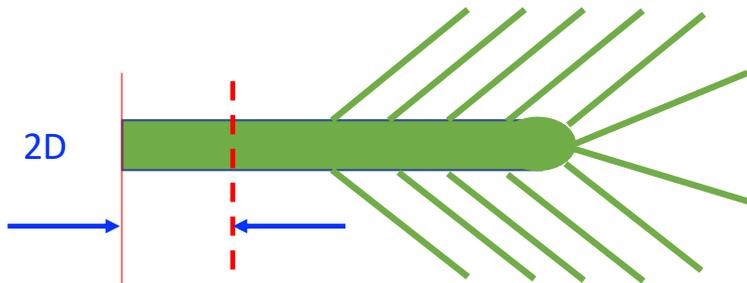
## July (4<sup>th</sup>: think lighting a fuse) (2)

*To balance the growth over the whole tree, weaken the top relative to the bottom (since pines are top dominant):*

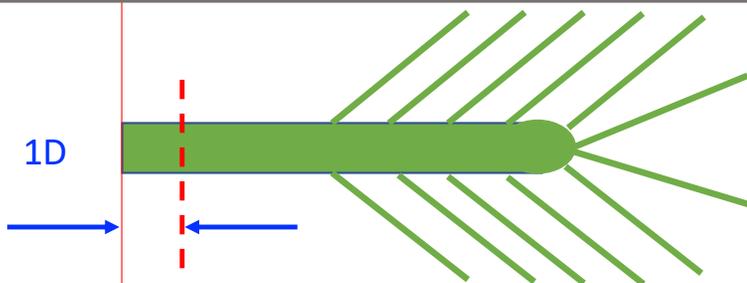
- **Top of the tree:** leave a stub two candle diameters in length (to delay the 2<sup>nd</sup> flush)
- **Middle of the tree:** leave a stub one diameter in length
- **Bottom of the tree:** leave shortest stub possible (to speed up the 2<sup>nd</sup> flush)

*Wait until the 1<sup>st</sup> flush needles are at least 45 degrees open (depends on seasonal conditions, but usually July for me )*

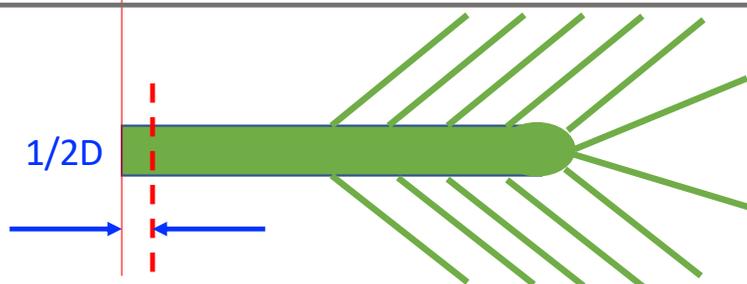
# Three Lengths of Chemical Signaling “Fuses”



**Top:** Cut candle to 2 Diameters long  
This is a long fuse with *delayed signal to restart growth*



**Middle:** Cut candle to 1 Diameter long  
This is a medium fuse with *average signal to restart growth*



**Bottom:** Cut candle to 1/2 Diameter long  
This a short fuse with a *prompt signal to restart growth the soonest*

# 1<sup>st</sup> Flush Candles: Grow Long for Strength



Before  
De-candling



After  
De-candling



*(only last years  
needles remain)*



## Black Pine De-Candling Images (August)



*Second flush candles emerge from the base of the stub: length does not determine bud position.  
(These stubs will get trimmed later in October)*



## Black Pine De-Candling Images (September)



*Second flush candles emerge from the base of the stub: length does not determine bud position.  
(These stubs will get trimmed later in October)*

# Black Pine Stub Trimming (October–November)



*Trim the dead stub from the 1<sup>st</sup> flush candle in October with a sharp pair of shears, to get a close cut. (photos from September)*



## July-September

- Let the second flush grow; including ***all of the multiple candles***
- A really strong branch can put out 10-12 new buds!
- A strong branch will put out 3-4 new buds
- A weak branch will put out 1 new bud and this is OK (but you need to strengthen the tree)

*Do not worry about number or length of 2<sup>nd</sup> flush candles: this balances their power and will help to further reduce the length of the candles you eventually choose*

## October or November (depends on growth)

- *Reduce all second flush candles to 2 candles at each location, in a horizontal plane.*
- Candles in a vertical plane will weaken the lower one
- Leaving more than 2 will produce an ugly swelling in later years. *(can leave three at apex to strengthen trunk)*
- Continue with Needle removal / thinning as described above.
- *The seasonal cycle is complete; and you begin again.*
- *Doubling the active tips for 3 years = 8x!!! 5 years = 32x!!!!*

# Black Pine that was **NOT De-candled** (too weak)



**Source:** John Planting (Carl Brown /Tosh)

**Pot:** 18 x 14"

**Trunk Diam:** 6"

**Age:** ~ 55 yrs

**Note:**

- too weak to de-candle this year
- Removed all old needles in July
- Weak: yellow needles in spring, short candles < 2
- Skipping de-candling means another year of no ramification...

# Black Pine Bark Examples (I like flaky bark)



# Cork Bark Black Pine Process

- Cork bark black pines are considered weak black pines; the bark is delicate, branches are brittle
- *Cork bark pines can use the normal black pine de-candle process, but only every 2-3 years, if extremely healthy.*
- Needles should be cut within the sheath, not pulled to avoid bark damage
- Remove 2-3-year-old needles in October
- If not de-candling, break all candles to ~ 2 inches length in mid-summer (June-July) to maintain compactness and remove last year's needles to clean up and wire as required (careful of wires in heat).

# Japanese Cork Black Pine (De-candled [Last Year](#))



**Source:** John Planting (Tosh graft)

**Pot:** 12"

**Trunk Diam:** 3"

**Age:** ~ 60 yrs

**Note:**

- Partially de-candled last year, ~ 2" candles
- Old needles were cut in July.
- Potted this way to support rock while building roots. Will repot this spring season into wider pot

# Japanese Cork Black Pine De-candling ([Last Year](#))



Ramification  
From last  
Year's  
de-candling



Ramification  
Near Apex  
From last  
Year's  
de-candling

*Not Every  
Year!!*

# Cork Bark Pine Bark Examples



## White Pine Process (Single Flush)

- *Do not de-candle White Pines: these pines cannot set a second set of candles*
- Cut all 2-3-year-old needles in October to open up the light
- *Break all candles to < 3 inches length* in June-July to maintain compactness and spread energy. You must leave needles!
- Typically top candles are stronger and will require breaking.

# Western White Pine (Single Flush; 5 Needles)



**Source:** Stephanie North (Bill Sullivan)

**Pot:** 19 x 13"

**Trunk Diameter:** 6"

**Age:** ~ 90 yrs

**Note:** Bill Sullivan collected in 1945  
Albuquerque, NM)



Needle Sheath  
remains on tree  
during the summer

# Western White Pine Back Buds



Back budding  
Is enhanced  
by breaking  
candles on a  
healthy tree

# Western White Pine Bark Examples (flaky)



## Bonus Tip #1: Osmocote in a Bag; neat & tidy



- Place a tsp of Osmocote in a tea bag
- 2 bags per pot keeps the Osmocote tidy
- Loose tea Bags from Amazon
- Come in different sizes
- Paper: recycle
- Nylon re-use

## Bonus Tip #2: Clean Sap off Your Tools Easily



AM Leonard (<http://www.amleo.com>) sells a nice tool cleaner. I use a drop on a stainless steel or brass brush and scub off the sap. Works very nicely, without dulling the finish!



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*Think about what it took to give a 5<sup>th</sup> generation tree to the US!*

*Michael Greenstein, September 2020*