

AMERICAN CONIFER SOCIETY

# conifer

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QUARTERLY

PAGE 7

## CONIFERS AT PLAY

PART 1

**SAVE THE DATES:** Western Regional Annual Conference • June 1–3, 2017 • Oregon Garden Resort, Silverton

# Winter 2017

## Volume 34, Number 1



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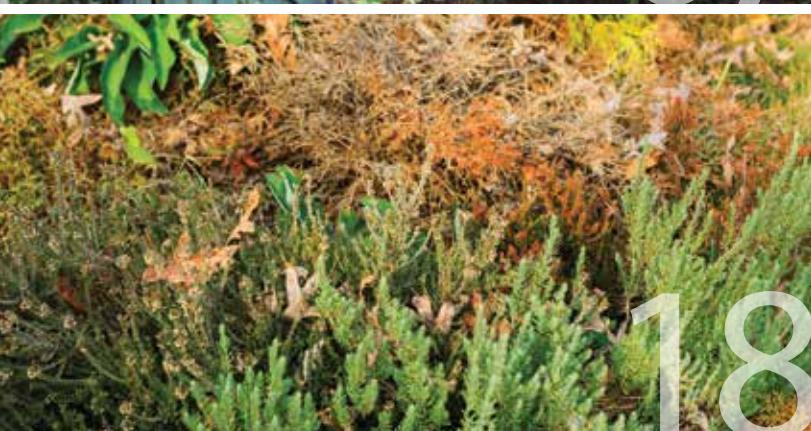
*Abies koreana*  
'Horstmann's Silberlocke'  
Photo by Don Wild



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# A LETTER FROM THE PRESIDENT

BY NEIL FUSILLO

**I'd like to take an opportunity to introduce myself as your newly-elected National President. Some of you know me, as I was Regional Director for the Southeast Region before this.**

I stayed mostly focused on the Region, and so many of you have never met me. I got into the Society through Tom Cox, whom most of you know, as I had been urged to meet him and see his garden back when I was learning more about conifers. Tom's been my mentor and friend, and it was he, who suggested I run for Regional Director in the first place. And now, here we are.

Being president of the ACS is a great honor, but there's no manual for it, so if I seem to be doing things a little differently from previous presidents, please bear with me. It's a learning curve. You are, of course, always welcome to contact me by email at [president@conifersociety.org](mailto:president@conifersociety.org), or by phone (though email is usually a more reliable option, as I spend a good bit of time nowhere near the phone) with any questions, concerns, or issues you feel need addressing. I may not have an answer right away, but I'm surrounded by some incredibly knowledgeable people both on the Board of Directors, and in my day to day dealings with the ACS. Thus, I will do everything I can to find you an answer and address your concerns.

As you well know, our mission at the ACS is:

- to promote the development, propagation and conservation of conifers,
- to encourage the appreciation and use of conifers in the landscape,
- to educate the public and professionals about conifers, and
- to spread the joy, knowledge and diversity of conifers across the world.

And to this end, I'd like to talk about a portion of our mission that is very near and dear to my heart—conifer conservation and public education. Spending a good portion of my youth

in the Southeast US, I was constantly surrounded by conifers to which I didn't even really pay attention—*Pinus taeda*, the loblolly pine. It's ubiquitous here in the Southeast, and it's so much part of the landscape, you never really notice it. It wasn't until I got interested in conifers that I truly began to notice them and appreciate their beauty. When I go to other parts of the country, I love to look out at the native conifers in the landscape—eastern white pine, Virginia pine, slash pine, white bark pine, Norway spruce, Douglas fir, the majestic redwoods...the list goes on and on. Every area has its native species which many of the locals take for granted as just being a part of the landscape. But, many of these local species are in trouble of one kind or another.

Without conservation efforts, a lot of the conifers we all know and love would suffer. *Pinus palustris*, the long leaf pine, was farmed to threatened levels in its native range, and only recently have any real conservation efforts taken place to restore it to the forests. Our own Larry Nau has worked with conservation efforts on its behalf. *Tsuga canadensis*, the eastern hemlock, is currently being wiped out systematically by the hemlock wooly adelgid, and there are important conservation efforts going on for replanting and treating them, as well as efforts to find a way to stop the adelgids from destroying all we have left. *Pinus albicaulis*, the white bark pine, is threatened in its native range, and there are efforts to restore it to the ecosystem. Everywhere we look, our beloved conifers are in trouble from climate change or from habitat removal or from over-farming. While it is not as glamorous, perhaps, as hunting for witch's brooms, or as gratifying as finding that one spectacular cultivar for the garden, conservation efforts, societies, and foundations all around the country need help and need to get the word out.

And, who better to help these conifer conservation societies than members of the American Conifer Society? I would like to urge all of our membership to get to know some of these conservation and restoration societies in your area and around the country and see what they're all about—maybe get some local members together for a volunteer weekend to help replanting efforts, or spread the word to the public. It's an opportunity for outreach and conservation that, as conifer lovers, we really can't afford to ignore.

If you know of any conservation societies which might not have heard of us, give them a call, or drop them a letter, or even shoot them an email and introduce yourselves. Or, feel free to email me their contact information, and I'll be happy to get in touch and find out what sort of opportunities there are for ACS members to get involved.

Thank you, and I hope to see you soon! ☺

# ARAUCARIA ARAUCANA SEEDS AND *ISISAURUS*

BY RON ELARDO

We all love adventures. Sometimes even a wild goose chase can be lots of fun. In all cases, research is required and perseverance too.

It's also nice to have a spark in that direction. The spark was provided to me by Sherry and David Speth, Wisconsin, Central Region. In a phone conversation and then on email, they told me the story about the existence of South American dinosaurs which dined on the seeds of the monkey-puzzle tree. I thought to myself that this would be an entertaining "note" to you. I followed their lead, and, lo and behold, there was indeed a connection between one of the largest Sauropods to have ever walked the face of the earth and the seeds of the monkey-puzzle tree.

(CONTINUED ON PAGE 6)



Araucaria araucana seeds



(CONTINUED FROM PAGE 5)

# ARAUCARIA ARAUCANA SEEDS AND *ISISaurus*

My guess was that the dinosaur must have had a tough mouth and rugged innards to have been able to harvest, eat and then digest anything from the tree. Monkey-puzzle tree looks more like a cactus than a conifer, but is one of the most rugged and ancient members of the Coniferae Family.

Anyone who has ever seen the tree knows that it is beautifully evil and daunting. Each leaf is a barb.

Had Snow White been tangled up in a forest of monkey-puzzle trees, she would have assuredly died, saving the Queen the misery of never being the Fairest in the land.

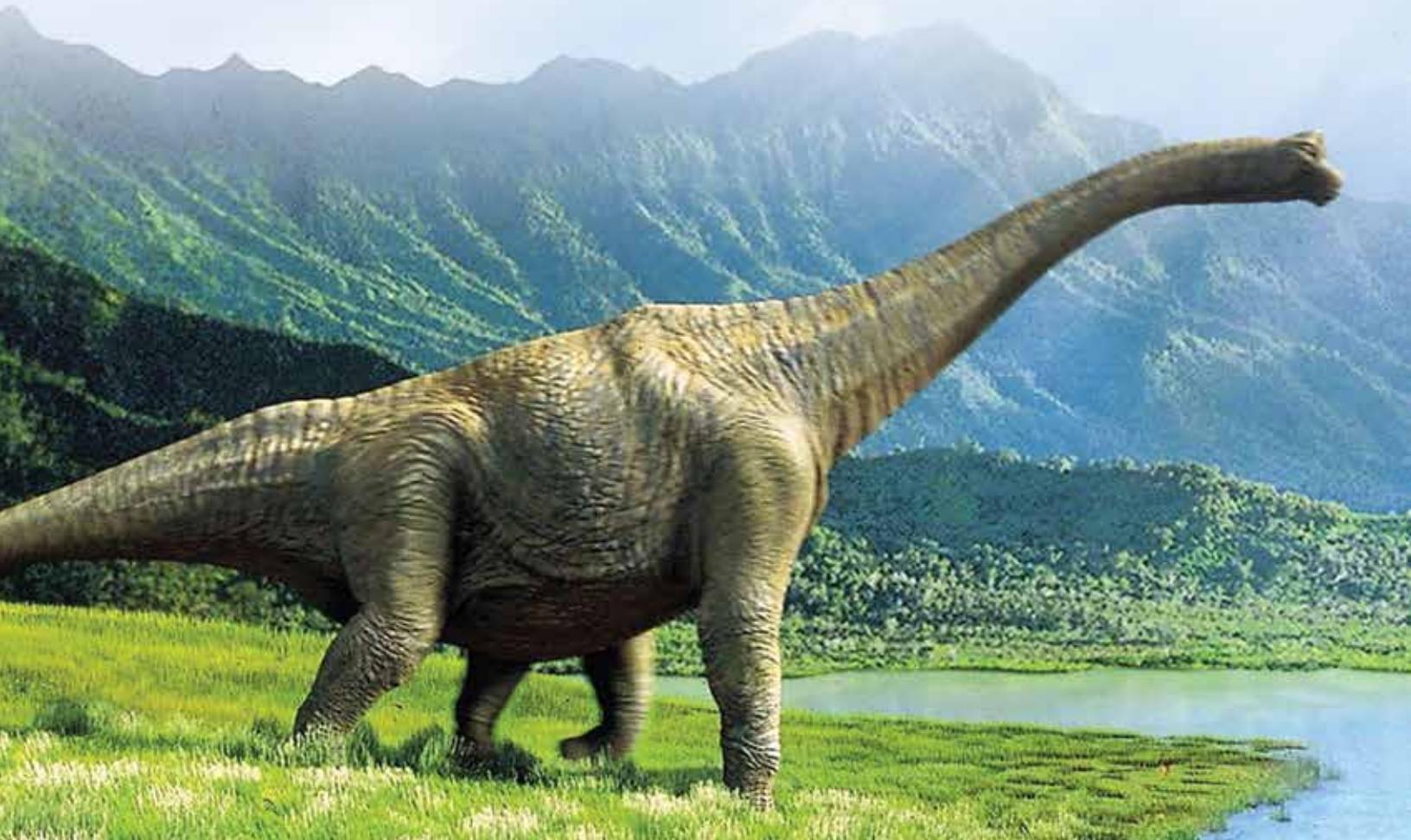
The animal capable of reaching the seeds and then eating them was *Titanosaurus*, now called *Isisaurus*, (as it has been moved to its own genus). *Isisaurus* roamed Patagonia 100 million years ago during the Upper Cretaceous period. A fossil of it was first discovered in 1877 by Richard Lydekker in India. Lydekker was a well-known naturalist and author. In the Records of the Geological Survey of India 10 (1): 30 – 34, he described how he discovered the bones of *Titanosaurus* in tertiary and secondary rocks.

*Isisaurus*, a Sauropod (vegetarian), weighed 77 tons and reached 40 feet at the shoulders and 100 feet in length. One of its food sources was the seeds of *Araucaria araucana*.

Thank you Sherry and David. What an adventure! ☺

## *Chamaecyparis lawsoniana* ‘Blue Surprise’

We've been made aware of an error on the order form for the Collector's Conifer of the Year in the last **CONIFERQUARTERLY**. The article about the CCOY correctly lists *Chamaecyparis lawsoniana* ‘Blue Surprise,’ but the order form incorrectly lists this as *Chamaecyparis obtusa*. It is most assuredly *Chamaecyparis lawsoniana* on disease-resistant rootstock, and we apologize for any confusion this may have caused. If you have any questions, please contact Neil Fusillo at [president@conifersociety.org](mailto:president@conifersociety.org), or Dennis Lee at [coniferden@msn.com](mailto:coniferden@msn.com).



# CONIFERS AT PLAY PART 1

BY JERRY KRAL

**A**n article in the Fall Issue of your CQ, 2016, asked you to save the dates, August 17–19 (20), for the 2017 ACS National Meeting and Conifer College in Syracuse, New York. Now it's time to get into more detail.

We all take pride in our personal journey of discovering conifers. First, we get a bad case of ACS ("Addictive Conifer Syndrome"), which causes us to lust after every new conifer introduction. We quickly have too many conifers for our garden space. We then spend a lot of time and money designing, re-designing, moving plants, borrowing neighbor's property; anything we can imagine to display in the best way our prized conifer acquisitions.

This article features the gardens of Karen and George Hanford and Dianne Bordoni and their personal journeys.

Registration Forms for both the **MAIN MEETING** (August 17–19) and **CONIFER COLLEGE-CNY STYLE** (August 20) are

included within this Issue of your CQ and on the website. The Conifer College article, authored by Suzanne Mahoney, will give you a brief biography plus a class title and description for each presenter. You can refer to these to make your class choices on the Conifer College Registration Form. Registration for the Main Meeting will be available on our website. The Registration Form for Conifer College can be downloaded or mailed in.

One other tantalizing gem to add to all this festivity is that our Keynote Speaker, Robert Fincham, will be introducing the third book of his conifer trilogy at the Syracuse National. Its working title is *Special Conifers for Special Gardens*. The second book, *Gone But Not Forgotten*, was released the Fall of 2016. The first book, *Small Conifers for Small Gardens* was very popular and is still available.

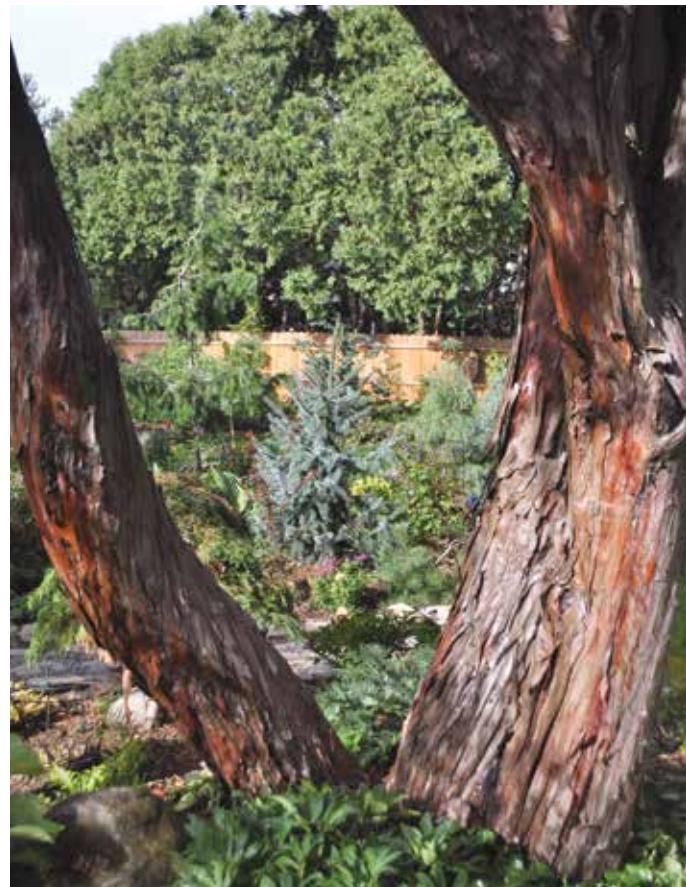
## Dianne Bordoni's Gardens

BY DIANNE BORDONI

When we purchased our suburban home in the summer of 1985, the property was, to say it politely, not well landscaped. To be less polite, it was a "jungle out of control". Old junipers were wrapped around the house and sprinkled here and there on the property. A half dozen yews had managed to dodge the hedge clippers and were approaching 25 feet in height. A row of mature cedars, which had never been maintained, twin dying Austrian pines, magnolias and various shrubs were a tangled mess which, by the way, had become home to a litter of feral kittens.

While I had no clear long-term objective at the outset, my first mission was to get some control. The first project was to eliminate the forest of yews. Several chainsaws later, only one still stood. With no remaining chainsaws, or energy, we left the last one standing—to be tackled the following summer. That follow-up never happened. Today, this unique yew is a highlight of my backyard. The beautiful orange/red bark and high dark green canopy gives the house needed shade in the summer and is a valuable garden feature. Thank goodness for yew's hard inner core which proved difficult to cut through, and, therefore, kept me from eliminating my "Yew Tree".

As the years passed, one Austrian pine was taken down, leaving a high stump to be used later for "who knows what".



*Taxus baccata* sp. "Trunks" (Picture by D. Bordoni)



*Thuja occidentalis* sp. "Trunks" (Picture by D. Bordoni)



*Larix decidua* 'Pendula'"Gate & Larch" (Picture by D. Bordoni)

I learned that I like to reuse and repurpose materials; it would have a use later on. The shade and sun gardens changed over the years as the old magnolias fell to various mishaps and plant diseases. Each area was revamped accordingly, with no real overall plan yet. The other Austrian pine had to be removed, leaving two tall vertical stumps. These pines now live on in the landscape in the form of a wonderful covered sitting area.

It seemed that each area of the yard took on its own character from the old trees removed or stones dug up. A few of the cedar trees became pillars for a walk-through in a transition area.

My then 8-year-old son helped me hand-dig a small seven-foot-wide pond as a weekend project. Well, it took longer than that given the size of the rocks we uncovered in that spot. The last one, a 3-foot boulder, we rolled up the side of the pond and called it quits. Luckily the hole was deep enough for fish to reside there all year long.

With all the areas taking on their own character, what was needed was a way to make the small property flow together. I gathered more rocks from long walks that I would take with my dogs. I connected beds, and over the years began to plant all varieties of trees. In some cases, conifers were used to frame walkways, or soften areas. My main focus of plantings was evergreens; not because they had always been my favorite, but because in Upstate NY, they truly keep the garden alive in the bleak winter months. Thirty-one years later, the garden is coming to maturity again with a revamped landscape design. Of course, my "lesson learned" is that the "jungle out of control", is, 31 years later, the essential foundation for my "new vision". Hopefully you will visit, and gauge for yourself how the very old relics have become new again and compliment their younger counterparts.



"Koi Pond" Background features *Picea orientalis* 'Bergman's Gem' and *Tsuga canadensis* 'Cole' (Picture by D. Bordoni)

# Sycamore Hill Gardens

BY KAREN HANFORD

We begin with questions frequently asked by visitors; "When did you start the gardens?", "Was there a master plan?", and, "Are the owners still living?" After the 2016 drought, and tending 35 acres with no irrigation, the answer to that last one is, "barely". But we're looking forward to 2017!

In the early 1990s, fields at Sycamore Hill began transitioning from the corn, hay, and heifers of an operating dairy farm to the trees, shrubs, and perennials of a conifer-centric private arboretum. Each venture began as a passing fancy, but soon became a passion. Just as one pet Jersey milk cow became a large herd which included several grand champion animals; one Father's Day Japanese maple became a 35-acre arboretum featuring dozens of grand champion conifers "pastured" amidst hundreds of rare shrubs and trees. Neither began with a master plan, they simply grew like frost on a windowpane.



Sycamore Hill's largest conifer installation, a 2,200 *Thuja occidentalis* 'Smaragd' (aka 'Emerald Green') maze. (Picture by George R Hanford)

Both endeavors required expert advice, good stock, studious husbandry, and many ups and downs. We learned the gardener's adage, first year they sleep, second year they creep, third year they leap-unless you have back-to-back bad winters.



"Witches' Wall" (Picture by George R. Hanford)

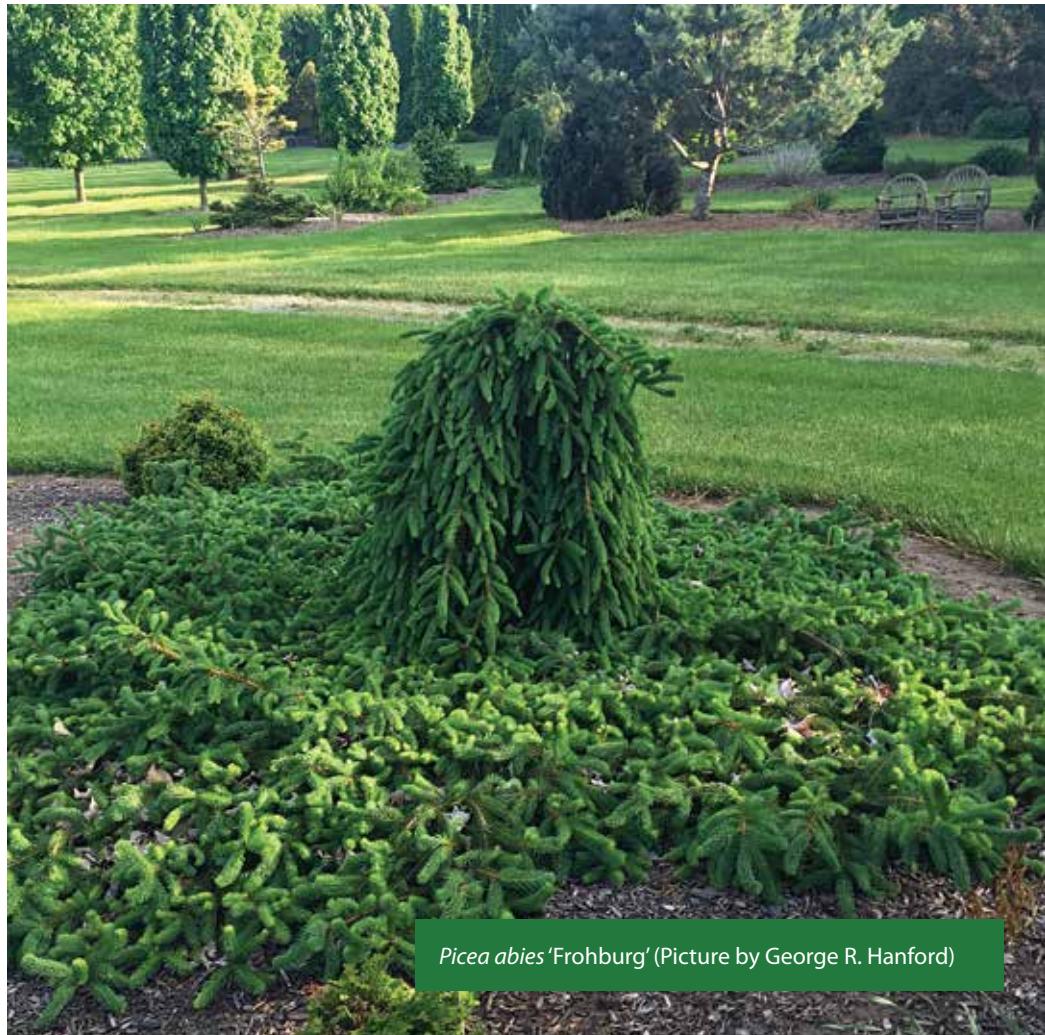


"The Sycamore Hill Dragon". Thirty-one *Picea pungens* 'Glauca Procumbens', (Picture by Karen Hanford)

Then they just plain die! But, as any dairy farmer will tell you, if you have livestock, you have dead stock. So, using what we'd already learned from farming, we traded in heifers for conifers, said goodbye to cow shows and champion udders, and hello to a whole new world where skirts are plant parts, and growth is measured in calipers and inches, not pounds and breeding cycles. Now, in 2016, we're as fascinated by the growth of a large installation of weeping Norway spruce as we once were with the progression from calf to All-American Grand Champion Jersey Female.

Our conifer passion led to many unique conifer displays. The Sycamore Hill Dragon pictured above is one. The installation of 32, alternating height, weeping Norway spruce (*Picea abies* 'Pendula'), draping their weeping skirts over the massive, locally quarried foundation stones of an 1890s penitentiary became another. A chance remark about the Norway spruces looking like witches riding their brooms turned an interesting conifer installation into the now infamous, "Witches' Wall".

Perhaps the best known and largest conifer display is "The Minotaur Maze". Over 2,200 emerald green arborvitae (*Thuja occidentalis* 'Emerald Green') offer several paths, many which are dead-ends or twist back to start over, which eventually lead to a very large, bronze statue of a Minotaur in the center. Maze guides are usually provided because it is very easy to get lost and confused.



*Picea abies* 'Frohburg' (Picture by George R. Hanford)

The conifer "skirts" of Sycamore Hill are especially flirtatious. Notable examples occur throughout the extensive landscape. Enjoy the 15' skirt of the Norway spruce 'Frohburg', flaring like the gown of a ballroom dancer in full twirl. Delight in the skirt of the *Picea abies* 'Pendula Snezna' trailing several feet behind the very "Druid-like" posture of the main plant. And, smile at the demure tango-like skirt of the 30-foot-tall *Picea pungens* 'Shilo Weeping'.



*Picea omorika 'Pendula Snezna'* (Picture by George R. Hanford)



"Maiden Amid Pines & Firs" (Picture by George R. Hanford)

And, do appreciate the life and larger than life sized lady & maiden bronzes, and creatures large and small as they pose, lurk or leap, welcoming you, or perhaps startling you as you enter each area of "Conifers at Play".

Today, in addition to collecting conifers, Sycamore Hill Gardens focuses on creating an engaging free venue for Central New York charities' spring and early summer fundraisers. Mother's Day alone dependably draws 3,000 attendees for our local nature center and raises a substantial portion of the funding for the summer's children's programs. With koi to feed in three large ponds, flowers to pick, temple bells to ring, an enormous bronze crocodile to pose on, stepping stones surrounded by water, a woodland dragon and picnicking encouraged, there's plenty for everyone to enjoy.

The same can be said for this year's ACS convention. You don't have to be a plant geek to enjoy an afternoon or two at



*Picea pungens 'Shilo Weeping'* (Picture by Karen Hanford)

Sycamore Hill Gardens. A good book, a comfortable chair by the ponds, paints and an easel, wine and a nap, a hammock in the shade—whatever works for you on a summer's day—will work wonderfully well here.

Of course, if you are a conifer aficionado, you'll be running around like a sight hound in a deer infested forest finding specimens and checking our Latin labeling. (Thank you, we'll take all the help we can get!) Throughout the gardens we strive for combinations of color and texture which showcase the best while appealing to guests with wildly varying levels of plant knowledge and interest. Something for everyone is truly our approach and we trust that whatever your special interests, you'll find something to enjoy at Sycamore Hill Gardens.

We look forward to seeing you this coming August at the ACS National Meeting. ☺

# CONIFER COLLEGE

BY SUZANNE MAHONEY

**P**lans for the 2017 National Meeting in the Northeast Region have been underway for almost two years now. The meeting promises award winning gardens, a fresh hotel renovation and an award winning chef in the kitchen. Then there will be acquired, choice plants for the auctions.

On Sunday, just when you would think there couldn't be anything else terrific to do, comes Conifer College, which includes a dinner cruise on Skaneateles Lake, Syracuse.

Basically, the idea of a Conifer College is to offer a series of classes which concentrate on answering questions we may all have. This year, the College will serve all segments of our membership as surveys have requested.

**Terminology:** A good way to start is to learn the terminology, which helps in ordering online or at the nursery. **David Olszyk**, ACS Western Region President and Board member, and ConiferBase Editor. David serves as technical editor of **CONIFERQuarterly**. He is the go-to guy when it comes to botanical nomenclature. His class is: "**I'M NOT CALLED PYGMAEA AURESCENS FOR NOTHING!**"



**Landscaping:** As author of several gardening books, host of a radio program for 10+ years and as contributing author to *The Detroit Free Press*, **Steve Nikkila** states that we want your garden to grow better, your landscape to be more pleasing, your outdoor work simpler." Steve's class is: "**COLOMBO ON CONIFERS...WHY'D IT DIE?**"



**The Plants:** **Bob Fincham** is our national keynote speaker, past ACS president and one of the ACS' founders. Bob will present a program on plant performance and size expectations over time. He's one who literally wrote the book. His class is: "**SMALL CONIFERS FOR SMALL SPACES**."



**American Trees :** Past ACS president Frank Goodhart will present a class featuring an overview of our great native American trees. He will demonstrate their importance in the landscape and their influence on current conifer selections. His class is: "**AMERICAN TREES.**"

**Container Gardening:** No matter how full your garden, no matter how small—even a front step, mini-patio or balcony; there is a container waiting for a "forest" full of conifers. Put a dwarf pine or a hemlock in a large container and, presto, you have a work of art. Jerry Kral will give a hands-on demonstration of this craft. His class is: "**CONIFERS GOING TO POT**".

## Landscaping: Good Principles and Great Conifers:

Get beyond the plunk-it-here tendency and push yourself to develop a cone-hesive landscape plan which uses your beloved plants to their best potential and beauty. **Christie Dustman**, a nationally certified and



award-winning landscape designer will discuss design principles and strategies which underpin dynamic planting plans. Her class is: "**SITE ME**".

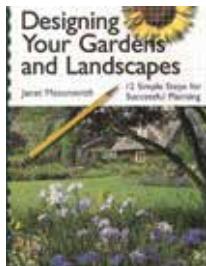
## The Right Conifer for the Right Place:

**Place:** **Brent Markus**, himself a national landscaper and Oregon nursery grower, will show the best and newest plants which fulfill the requirements and needs of your landscape plan. With his expertise and vision, you will see many plant options for your garden and beds. His class: "**THE RIGHT CONIFER FOR THE RIGHT PLACE.**"



## Plant Maintenance and Diseases:

Janet Macunovich and Steve Nikkila will both give the scoop on the best horticultural practices on pruning and treatment of diseases. Janet will demonstrate a hands-on pruning. Her class is: "**GIVING YOUR CONIFERS A HAIRCUT**".



**The Party Boat:** The culmination of Conifer College will be a dinner cruise on Skaneateles Lake. The entire boat is reserved for the College attendees.



## NOTA BENE (Note well):

Space is limited for each of the classes, and only the first 80 registrants for the College may enjoy the lake cruise. **Register early!**

**Sponsors:** Christie Dustman, Finger Lakes Wineries, George and Karen Hanford, Harbor View Wine and Liquors, and Jerry and Karen Kral have graciously donated to Conifer College.

# FREQUENTLY ASKED QUESTIONS

## The FAQ's\* about conifer nutrition and fertilization

BERT CREGG, PH.D.  
MICHIGAN STATE UNIVERSITY  
DEPARTMENT OF HORTICULTURE  
DEPARTMENT OF FORESTRY

**N**utrient deficiencies are a common cause of reduced growth or poor appearance in many plants, and conifers are no exception. Unfortunately, the Internet and other sources are full of home remedies for nutrient deficiencies that are of dubious value as well as other misinformation about plant nutrition and proper fertilization. Below are some of the common questions which arise when dealing with nutritional issues in conifers.

### What nutrient elements are needed for conifers?

Conifers, like all plants, require 16 elements for normal growth and development. Plants obtain three of these elements; carbon, hydrogen, and oxygen, from air and water. These three are not considered when discussing nutrients which must be obtained from the soil. The remaining elements are grouped based on the relative amounts contained in leaf or needle tissue. Macronutrients are elements which occur in relatively large amounts, usually 0.1 to 2.5% of leaf dry weight. These are nitrogen, phosphorus, potassium, calcium, sulfur, and magnesium. Micronutrients are elements needed in relatively small amounts, sometimes as little as a per million of leaf dry weight or less. These elements are sometimes referred to as trace elements and include: iron, boron, manganese, molybdenum, copper, zinc, and chlorine. See table for abbreviated elements.

### Essential mineral elements needed by conifers

Macronutrients		Micronutrients	
Element	Sufficiency range % needle dry weight	Element	Sufficiency range ppm needle dry weight
(N) Nitrogen	1.2-2.0	(Fe) Iron	50-200
(P) Phosphorus	0.1-0.2	(B) Boron	10-100
(K) Potassium	0.4-0.8	(Mn) Manganese	100-250
(Ca) Calcium	0.2-0.5	(Cu) Copper	4-20
(S) Sulfur	0.1-0.2	(Zn) Zinc	10-150
(Mg) Magnesium	0.1-0.15	(Mo) Molybdenum	0.1-5.0
		(Cl) Chlorine	10-3,000

NOTE: Sufficiency ranges based on field-grown conifers. Values may range higher in container-grown nursery plants under intensive fertilization. Adapted from USDA Forest Service Forest Nursery Notes. Rngr.net

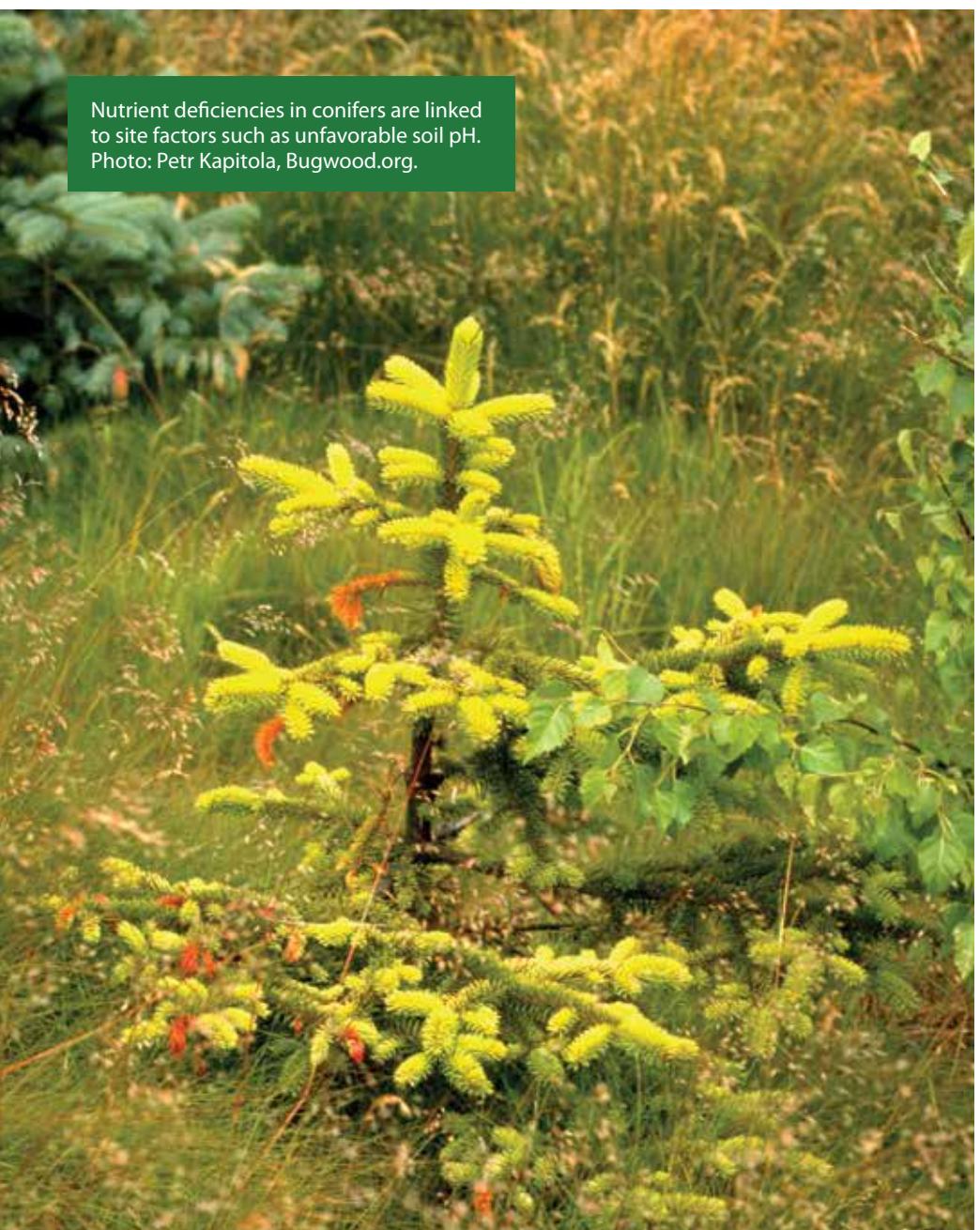
### Are there certain elements commonly deficient in conifers?

Conifers, especially evergreen conifers, typically have lower nutrient requirements than deciduous broadleaved trees since evergreens don't have to produce an entire new canopy of leaves every year. The likelihood of encountering nutrient deficiencies depends on several factors including the type of conifer and soil conditions. In general, micronutrient deficiencies are comparatively rare since plant need for these elements is low, and most soils can supply them in adequate amounts. Some exceptions are iron and manganese, which can occasionally become deficient as soil pH increases. Nitrogen can become deficient since it is the element plants need in the largest amounts. Also, nitrogen is very dynamic in soils and can be lost by a variety of

ways such as leaching, volatilization, and denitrification. Magnesium and potassium can sometimes be limited in sandy soils that have a low cation exchange capacity and, therefore, a low ability to retain these nutrients. Phosphorus availability in soils varies widely around the country and even between locations within a region. Because excessive P can contribute to surface water pollution, it is important to establish a need for P before applying P fertilizer. In fact, some states have banned P fertilizers for homeowners, or require a soil test before applying P fertilizer.

### How do soil properties influence plant nutrition?

Plant nutrient availability is inextricably linked to soil properties. Discussing all the soil factors which impact plant nutrition is beyond the scope of



Nutrient deficiencies in conifers are linked to site factors such as unfavorable soil pH.  
Photo: Petr Kapitola, Bugwood.org.

this article, but there are two key soil properties critical to dealing with plant nutrition; soil pH and soil texture. For most plants, the optimum soil pH is around 6.5. This is because the availability of some elements decreases as pH goes above 6.5 while others decrease as pH goes below 6.5. For conifers, this "sweet spot" of soil pH is lower than for deciduous trees, usually 6.0 or even a little lower. Soil texture describes the relative proportion of sand, silt and clay particles in a soil. Ideally, soils should have a mixture of particle sizes since sand provides porosity and air space while silt and clay contribute to water holding capacity. Clay particles, along with soil organic matter, also contribute to cation exchange capacity (CEC). CEC refers to the ability of a soil to act as a reservoir for important nutrients such as K, Mg, Fe, Mn, Cu and Zn. Conifers grown in very sandy soils with low organic matter have a potential to experience deficiencies of some of these elements.

### How do I diagnose a suspected nutrient problem?

Diagnosing a suspected nutrient problem in conifers often requires some detective work. Visible symptoms expressed by a plant are usually the starting point. There is a common misconception that nutrient deficiencies can be diagnosed by simply matching the plant symptom to an image in an extension bulletin or website. In reality it's rarely that simple. Several nutrient deficiencies can result in symptoms that look similar; N, Mg, and Fe deficiencies can all result in chlorotic (yellow) foliage. It is also possible that symptoms may not be related to a nutrient problem at all. Drought, heat, insects, herbicides and other factors can produce symptoms that can be mistaken for nutrient problems, so it is important to eliminate other causes. A soil test that includes soil pH is a minimum requirement to adequately assess a nutrient problem. In many states, soil testing is available through university extension services, as well as through private labs. Detailed instructions for collecting and

**Amount of elemental sulfur required to reduce soil pH to 6.5 based on soil texture and initial soil pH**

Initial soil pH	Pounds of elemental sulfur		
	Sand	Silt	Clay
8.5	45	55	70
8.0	28	35	45
7.5	11	18	23
7.0	2	3	7

Adapted from: *Western Fertilizer Handbook* 8th edition.

handling samples are usually provided by most testing labs. The key step to remember is to collect a series of samples which are representative of the area where plants are having issues. Many university extension labs and private labs also perform foliar nutrient analyses. These will show the actual concentration of the essential nutrients in the leaf tissue. Again, detailed directions on sampling are available from most labs. Foliar sampling is particularly useful in nurseries and large landscapes where it is possible to sample "good" and "bad" specimens of the same species or cultivar. By comparing the foliar test results of the two samples, nutrients that are deficient will often become apparent.

### Should I fertilize my conifers?

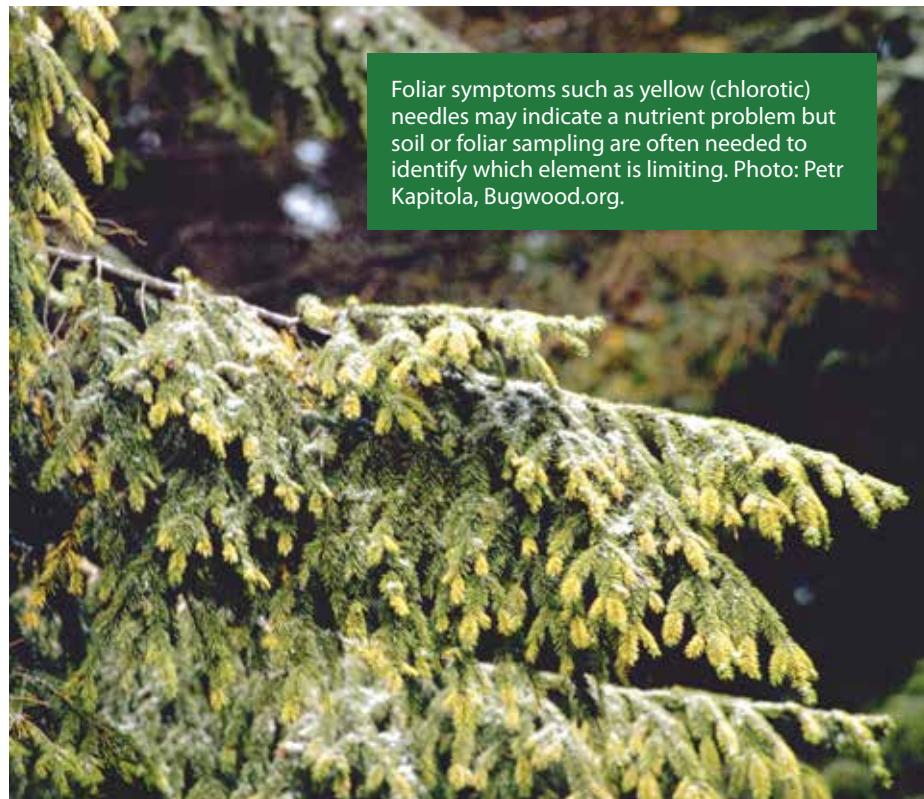
With increased public concerns over the impacts of excessive fertilizer nutrients on our surface waters, the days of recreational fertilization are over. Fertilizers need to be applied with a purpose. This requires identifying a specific deficiency through visible symptoms, a soil test, a foliar test, or, preferably, a combination of at least two methods.

### When should I fertilize conifers?

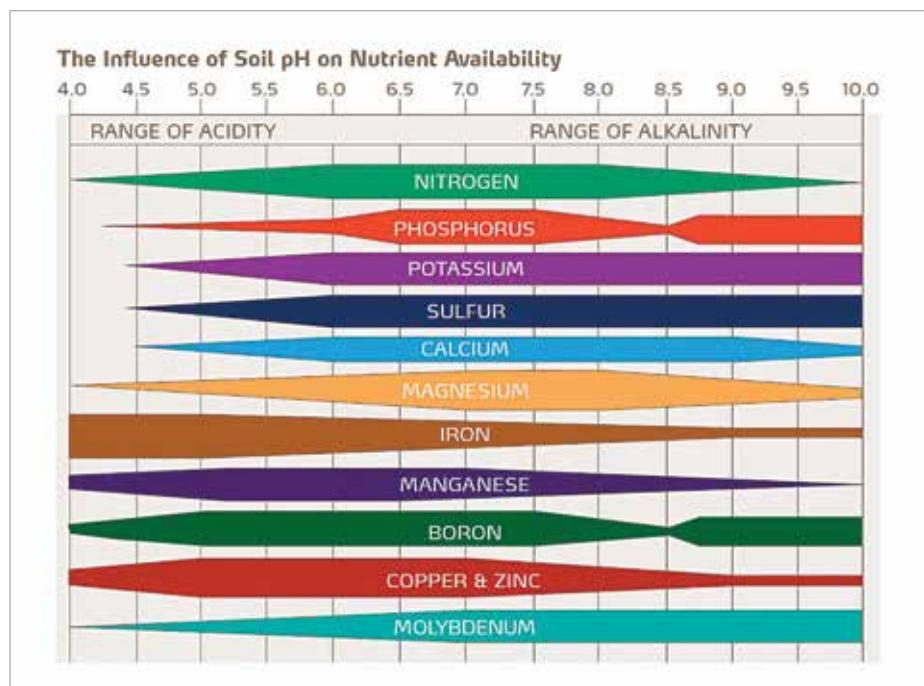
Fertilizer nutrients are most efficiently taken up when roots are actively growing. For most trees, including conifers, this usually means during the spring. Avoid fertilizing in the summer to reduce potential volatilization in hot weather. Fertilizer can also be applied in the fall after budset, but there is potential for leaching if using a nitrate-based N source. If a soil test indicates that soils are deficient in potassium, muriate of potash (KCl) is a commonly-used source of K. This is a fertilizer which has a high salt index. It is often applied in the fall to reduce the potential for fertilizer burn and to allow excessive chloride to leach out with rainfall and snowmelt.

### What is the best fertilizer to use?

The best fertilizer to use is one that meets plant needs based on a soil test or foliar test. Where possible, look to



Foliar symptoms such as yellow (chlorotic) needles may indicate a nutrient problem but soil or foliar sampling are often needed to identify which element is limiting. Photo: Petr Kapitola, Bugwood.org.



Soil pH has a dramatic effect on nutrient availability. In this chart the width of each bar indicates the relative availability of each nutrient element. Image: Yara North America.

use a fertilizer which addresses more than one need. For example, if plants are N deficient and soil pH is above optimum, a fertilizer that contains ammonium sulfate can help to add nitrogen and reduce soil pH. Avoid

applying excess elements that are not needed. For example, if plants are deficient in N, but a soil test indicates other nutrient are sufficient, use a N source such as coated urea rather than a complete fertilizer such as 10-10-10,

which will provide excess phosphorus and potassium that are not needed.

### How much should I fertilize?

Most soils labs will provide fertilizer recommendations along with soil test results. This will usually include a recommendation for N along with any soil element that is deficient. Labs that are accustomed to working with homeowners may report fertilizer recommendations in pounds per 1,000 sq. ft. of ground area. So, if you have a landscape bed that is 10' x 25' (250 sq. ft.), you would multiple the recommended amount by 250/1,000 or 0.25. Many agricultural labs will provide recommendations in pounds per acre. The key number to remember is 43,560 - which is the number of sq. ft. in an acre. So, for our 250 sq. ft. bed, the conversion is 250 / 43,560 or 0.006. Also, an internet search of "area conversions" will link you to many useful calculators.



Needle chlorosis in Mugo pine. Photo: Petr Kapitola, Bugwood.org.

### How can I adjust soil pH?

If a soil test indicates that pH is lower or higher than the desired range, it may be possible to adjust pH either by adding lime to raise the pH, or applying sulfur to lower the pH. Most soil test reports will supply recommendations for lime rates to achieve a desired pH. In general soil pH adjustments will be easier to accomplish on coarse soils than on clay soils. Liming is most effective when lime can be incorporated into the upper surface of the soil. For this reason, lime is often applied as a pre-plant adjustment. Surface application of lime after plants

are established can be effective, but the effect will be much slower than if lime is incorporated. In agronomic crops applying sulfur to lower pH is less common than liming to raise soil pH, so soil testing labs may not provide recommendations for lowering pH. The table provides some general guidelines for using elemental sulfur to lower pH. Soil pH can also be reduced by applying urea, ammonium sulfate or other ammonium-based fertilizers. Conifer gardeners may also apply products such as Holly-tone or Miracid to adjust pH. When using sulfur or fertilizers to lower pH, keep in mind that soil acidification is accomplished by soil microbes. So, it may take a year or longer to see the desired impact. As with liming to raise pH, it is typically harder to affect a change on a clay soil than on a coarse soil. Lastly, the effect of the sulfur on pH is transitory and pH will drift back up over time, so be prepared to follow up with additional soil tests and re-adjust every three years or so.

### What is a fertilizer analysis?

Fertilizer analysis (or grade) refers to the chemical composition of a fertilizer. By convention, fertilizers are classified by three numbers such as 10-10-10, which represent the amount of N, P, and K in the fertilizer. The first number is the % N in the fertilizer. Thus, if a soil test recommended 1.5 lbs. of N for a 1,000 sq. ft. bed, we would need to add  $1.5 / 10\% = 15$  lbs. of product. For P and K the numbers are little more complicated. The second number is the amount of P as phosphate ( $P_2O_5$ ), and third value is the amount of K as potassium oxide ( $K_2O$ ). Fortunately, most soil tests will provide a recommendation based on the amount of  $P_2O_5$  and  $K_2O$ , and many commercial fertilizer bag labels now express the analysis in both the traditional  $N-P_2O_5-K_2O$  format as well as actual elemental concentration. And, if all else fails, a quick internet search of "fertilizer calculator" will link to a number of excellent university extension sites.

### What about foliar fertilizer?

Foliar fertilization refers to the application of liquid fertilizer directly to

the foliage of plants to remedy a nutrient deficiency. Growers apply foliar fertilizers in certain horticultural applications such as bedding plants in order to overcome specific deficiencies and prepare plants for sale. Most conifers are poor candidates for foliar fertilizer because the thick, waxy cuticle on their foliage is a barrier to nutrient uptake. In certain situations, micronutrient deficiencies in conifers may be addressed with foliar fertilization, but a better approach is to understand and address the underlying soil nutrient or pH issues.

### What about organic fertilizers?

Organic fertilizers include a wide array of products that supply nutrients from living or once-living sources. These are in contrast to most standard inorganic fertilizers produced synthetically. Some examples of organic fertilizers are composted manures, fish emulsions, bone or blood meal, and Organic Materials Research Institute (OMRI) – approved pelletized organic products. We have conducted trials growing conifers with OMRI-approved and conventional fertilizers at Michigan State University and, given the same amount of nutrients, trees grew similarly and had similar foliar nutrition with both types of products. Some factors to consider in using organic products include material handling (organic products usually have a relatively low analysis so more product needs to be applied) and odors and attractiveness to animals for products such as fish emulsion or blood-based products.

### Summary

Most garden soils can provide adequate nutrients to grow quality conifers. When nutrient problems occur, try to identify the underlying cause, which usually requires a soil test including soil pH. If fertilization or soil pH adjustment is recommended, focus on addressing the principle issue and avoid applying fertilizer elements, especially P and N, if they are not deficient. This will help to keep your conifers looking healthy and protect the environment. ☀

# Jean Iseli

## 2017 MEMORIAL GRANT

The American Conifer Society annually awards a \$4,000 grant to a public garden, arboretum or horticultural institution which has demonstrated its support of the development, conservation and propagation of conifers with an emphasis on dwarf or unusual varieties.

The award was established in 1986 to honor the memory of plantsman **Jean Iseli** of Boring, Oregon, who was an ACS Founder and conifer propagator.

**A successful application should contain the following:**

- The name, full address, and phone number of the institution and person at the institution applying for the award.
- A short overview of the mission statement or horticultural background of the institution applying for the award.
- A brief description of how the ACS grant funds would be used, including a budget.
- A complete listing of plant materials (if the request involves conifer purchases).

**Applications must be received by July 10, 2017.** The announcement of the grant recipient is made upon Board of Directors' approval (usually within 60-90 days).

**SEND APPLICATIONS OR QUERIES TO:**

Ethan Johnson  
39005 Arcadia Circle  
Willoughby, Ohio 44094-7879  
Email: [ejohnson@holdenarb.org](mailto:ejohnson@holdenarb.org)

# HARSH LESSONS

BY NEIL FUSILLO

**Last year in Georgia, we had record-breaking temperatures starting in May of 2015. May was the hottest May ever on record. And, then June was the hottest June ever on record. And then July.**

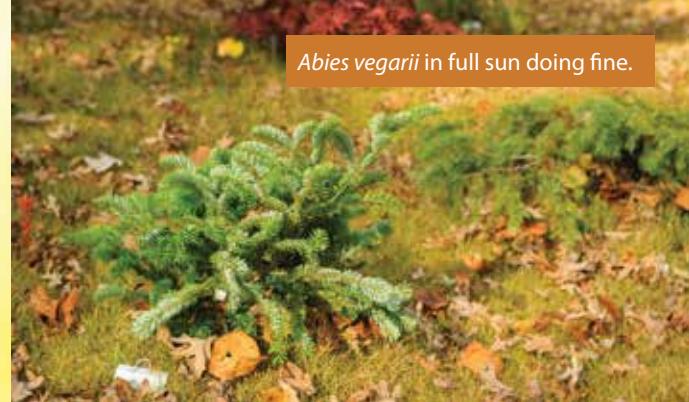
This record breaking warmest month on record actually lasted through until autumn 2016. May of 2016 was warmer than May of 2015. June of 2016 was warmer than June of 2015. And, while October didn't break a record for the monthly average, it broke records for October heat during the month. It's an alarming trend I fear which will not abate soon. While there have always been warm and cool cycles in the planet's history, global temperatures are hotter than they've ever been since the creation of the Earth, and there's no sign that this will subside.

Coupled with these insane temperatures, we've had a drought in Georgia which has ranged from extreme to exceptional—the highest classification. In my garden, I've had problems worse than we've ever had. While neighboring areas have seen a little rain now and again, I've recorded only 2.49 inches of rain since January 2016. It's November now. You can imagine that this makes gardening a bit of a challenge, but just look at it like this: we've had less rain than Death Valley had this year. And there's no rain in sight. They're expecting a drier than usual winter.

Adding these two hardships together has cost me dearly. I've lost 51 conifers this season, and two Japanese maples. It's been nothing short of demoralizing to walk out into the garden and find a new dead plant each time. It's made me more and more resistant even to go into the garden, knowing full well that each time I did, I'd go back inside demoralized. A garden must be tended, and so I've done what I can. Water bills have been through the roof, but it never seems to be enough.

There have, however, been some interesting discoveries in the garden about what is truly heat- and drought-tolerant and what isn't. Some plants you expect to do well—desert conifers and plants. Some, you would expect to fare very poorly—coastal plants and swamp conifers. But while there have been some understandable losses, there have also been some truly surprising survival stories.

I've lost more *Pinus parviflora* than I'd care to remember, and *Pinus densiflora* too. I've lost several *Pinus thunbergii*. These are things you might expect to weather the drought well, being pines, but they didn't. *Pinus thunbergii* is especially finicky about drought. In my garden, I've found I can never water one enough. But if I water just a little less than it



wants, it browns and dies and there's nothing I can do to save it. I've probably lost a half dozen 'Thunderhead' alone, and a good many *thunbergii* species. Every *Abies concolor* on *firma* rootstock I had, but one, has died. Some were well established, had been in the ground for years, and looked spectacular. But alas, they were not meant to be. I lost a *Cunninghamia lanceolata*, and most of my *Picea abies* dwarf plants. Most of my *Picea pungens* died as well, and all my *Picea engelmannii*. I've lost some *Abies koreana*, and a *Picea alcoquiana*. I lost a 12 foot *Cedrus deodara* 'Blue Snake', and a 12 foot *Metasequoia glyptostroboides* 'Ogon', and all of my poor *Taxodium*. I even lost a few *Chamaecyparis obtusa* which just dried up suddenly over the course of a week.

But it wasn't all loss. Some plants have done spectacularly during the drought. As one would expect, the *Cupressus arizonica* var. *glabra* all came through without issues. But surprising to me was that *Abies veitchii* on *firma*, sitting in the hottest full sun, survived without so much as a scorched needle. And my *Calluna vulgaris*, in the full sun, is growing like a weed. Imagine—heather. In full sun. In the hottest temperatures we've ever had in Georgia. It gets a good watering weekly, but everyone told me I'd never grow it here, and now it's one of my favorite ground covers. My *Abies pinsapo* did fine—both the ones grafted onto *firma* and the species on its own roots. And, weirdly enough, my *Abies alba* on its own roots is into its 4<sup>th</sup> year with no issues whatsoever. *Abies alba* loves it here. I've no idea why. All of my *Pinus mugo* cultivars are happy and healthy as long as they get plenty of water. My *Sequoia sempervirens*, often neglected and unwatered in areas that aren't always easy to get to, has thrived. I bought a bunch of different cultivars from Crowfoot Nursery a while back as I wanted to experiment with having

coastal redwoods in the garden, fully expecting them to have issues, as they don't get the same kind of moist air. But they've given me not one single issue at all. They've grown lush and beautiful. In no time at all, I'll have a redwood forest. *Abies pinsapo* on its own roots has thrived. *Abies chensiensis* seems to do fine in full sun or full shade or anything in between, and has for some years without a hitch. Strikingly, against the common wisdom, *Abies fraseri* grafted onto *firma*



*Picea engelmannii 'Blue Magoo'*



*Picea abies 'Nidiformis'*



*Chamaecyparis lawsoniana 'Ivonne'*  
showing off its lovely, dead color.

has grown quite well. I was always told that the heat here would kill it, even if grafted onto a rootstock which wasn't as susceptible to *Phytophthora*. But I've found that not to be the case. *Abies nordmanniana x numidica*, which I always refer to incorrectly as *Abies nordica* in my head, has thrived with only some of the barest supplemental watering. *Pseudotsuga japonica*, *sinensis*, and *menziesii* are all doing well and have suffered no ill effects. *Taxus mairei* is thriving. *Taxus floridana*, neglected in the shade of a holly tree, has continued to grow undaunted. A tiny little seedling of *Torreya californica*, which I couldn't get to as it was just across a large nest of yellow jackets, has continued to grow without water or care. I can see it. I just dare not get close yet, for even in November, the wasps are making life unhappy for unwary walkers.

As the years go on, if they continue this trend, I imagine I shan't see a bit of green left in the garden save for a cactus or two I might plant. But for now, while there's been grievous heartache and bitter disappointment at losing some of my favorite specimens, there has also been some fascinating information I've been able to gather about what truly is a strong and worthy plant in the garden. While I may not win any awards for the beautiful brown conifers which keep turning up, I'm gaining valuable knowledge about how to shape my garden for the future and what is delicate and what is less so. As growers of conifers, we're often taking plants well beyond their native ranges and trying our best to adapt them to our homes. It's often quite successful, as they're resilient beasts, and have well adapted to growing in some of the harshest conditions on the planet. This summer has been a solid reminder that challenging nature is never a road we can walk lightly, as she's demanding, unforgiving, and bound to teach us some very harsh lessons.

## In Memoriam:

*Abies concolor 'Candicans' {firma}, Abies concolor 'Compacta' {firma}, Abies concolor 'Wintergold' {firma}, Abies concolor spp, Abies homolepis, Abies koreana spp, Abies lasiocarpa var. *arizonica* 'Glauca Compacta' {firma}, Abies nordmanniana spp, Abies procera 'Blaue Hexe' {firma}, Abies procera 'La Graciosa' {firma}, Acer palmatum 'Aka Shigitatusawa', Acer palmatum 'Purple Ghost', Chamaecyparis obtusa 'Blue Feathers', Chamaecyparis obtusa 'Moonlight Lace', Chamaecyparis obtusa 'Thowell', Chamaecyparis obtusa 'Verdon', Chamaecyparis pisifera 'Boulevard', Chamaecyparis thyoides 'Ericoides', Chamaecyparis thyoides 'Heatherbun', Cunninghamia lanceolata 'Chason's Gift', Cupressus arizonica var. *glabra* 'Limelight', Juniperus horizontalis 'Blue Chip', Juniperus x pfizeriana 'Blue and Gold', Metasequoia glyptostroboides 'Ogon', Metasequoia glyptostroboides 'Schirrmans Nordlicht', Picea abies 'Little Gem', Picea abies 'Nidiformis', Picea abies 'Pumila', Picea abies 'Tompa', Picea alcoquiana 'Howell's Dwarf', Picea engelmannii 'Blue Magoo', Picea engelmannii 'Bush's Lace', Picea glehnii 'Chitosemaru', Picea omorika 'Bruns', Picea omorika 'Pendula Bruns', Picea omorika 'Pimoko', Picea orientalis 'Aureospicata', Picea pungens 'Bonny Blue', Picea pungens 'Spring Ghost', Picea pungens 'St. Mary's Broom', Picea pungens 'Walnut Glen', Pices abies 'Acrocona', Pinus densiflora 'Aurea', Pinus densiflora 'Umbraculifera', Pinus parviflora 'Aoba-Jo', Pinus parviflora 'Fukai', Pinus parviflora 'Ogon', Pinus sylvestris 'Bonna', Pinus thunbergii 'Thunderhead', Pinus thunbergiana spp., Taiwania cryptomerioides, Thujopsis dolabrata 'Aurea', Thujopsis dolabrata var. *hondae*.*

# THE TREE THAT CRINGED

BY BOB IGLESIAS

**It's been some 25 years now since I planted a small, dwarf conifer labeled *Pinus densiflora* 'Umbraculifera' (Tagyoushou) in my northern New Jersey garden. Today, that mature "dwarf" has reached a height of 8 feet (244 cm), and has a round, spreading canopy measuring 9 feet (274 cm) in diameter.**

Over the years, I've seen this type of Japanese red pine marketed under several cultivar names, including 'Umbraculifera', 'Tanyosho', 'Tagyosho', and Tagyoushou. Here in the U.S., 'Tanyosho' has become the cultivar name most commonly seen. While probably the easiest of the cultivar names to say, 'Tanyosho' is reputedly a rather poor transliteration of the original name in Japanese. I prefer the alternate name, 'Tagyoushou', since it's closest to the original term that translates to "many trunks".

True to its name, my Tagyoushou has a strong vertical central trunk which abruptly radiates into a funnel-shaped formation of smaller branching trunks. If left unpruned, the canopy of my tree eventually would have become an open, rounded dome. However, by carefully pruning the emerging candles each year, I've trained it into a classic "flat top".

I have a story to tell you about this tree.

Early one morning, I got out a tall ladder with the intent of cleaning off the Tagyoushou's broad table top. Strong winds had blown down a squirrel's nest from a nearby tree and the canopy was littered with twigs and leaves. Since rain

was predicted, and the sky was already darkening, I wanted to finish in advance of the approaching storm. As I set up my ladder, the rain began.

Although I knew that standing precariously on a wet, 10 foot high metal A-ladder during a rainstorm is NOT a good idea, I stubbornly climbed



Wet 'Tagyoushou'

up and hurriedly picked off the twigs and leaves. As I was about to descend, the tree's flat canopy in front of me abruptly appeared to droop and the needles shriveled, as though some invisible entity had just landed upon it. For a brief moment, I wondered if this was a prelude to the lightning strike I had so brazenly tempted. But the rain



Dry Tagyoushou



at that point was a steady drizzle, and the movement I was seeing in the tree was not being caused by lightning, the impact of a hard downpour, or the wind. The movement was coming from the tree itself.

From my high vantage point on the ladder, I watched as the pine's needles pressed against the now limp and drooping branches to which they were attached. They appeared to mimic the movement of the ribs of a wet umbrella as it's being closed. Openings appeared in the canopy. As the rain increased in intensity, I held tightly onto the slippery ladder and carefully climbed down, impressed by the phenomenon I'd just

witnessed. It almost seemed as if the tree reacted to getting wet by "cringing", much as we humans instinctively raise our shoulders while running for shelter through a hard downpour.

Once the storm had passed, the branches and their needles straightened as they dried in the sun. The openings which had appeared in the top of the flat canopy closed up. The next day, I hosed down the other conifers in the garden, but none of them duplicated this needle folding effect.

Curious as to how water triggered the close-up of needles, I searched for whatever information might be

available, including our own ACS plant profiles, but did not find any mention of the subject. I thought that the effect might be associated somehow with the softening of wet twigs at the attachment of each twin-needle fascicle. I also wondered what evolutionary purpose this would serve the tree in nature. Did the needles fold down to open the canopy, thereby allowing more rain water to reach the root zone underneath? Was there perhaps some other benefit, such as a reduced likelihood of damage from violent seasonal rains and high winds?

As indicated, I have not found any mention of needle movement in available descriptions of the Japanese Red Pine and its Tagyoushou form. Of course, it's quite possible that what I observed, while new to me, could be well-known in botany as a characteristic typical of the species. But, then again, if this phenomenon is not well known or documented, I hope my story inspires further study of a most unusual and interesting conifer.

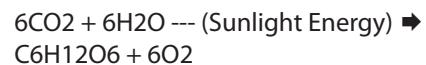
In any case, whenever I'm out watering the garden, I always make a point of wetting down "Ol'Tagyoushou", just for the slightly wicked fun of watching it cringe.

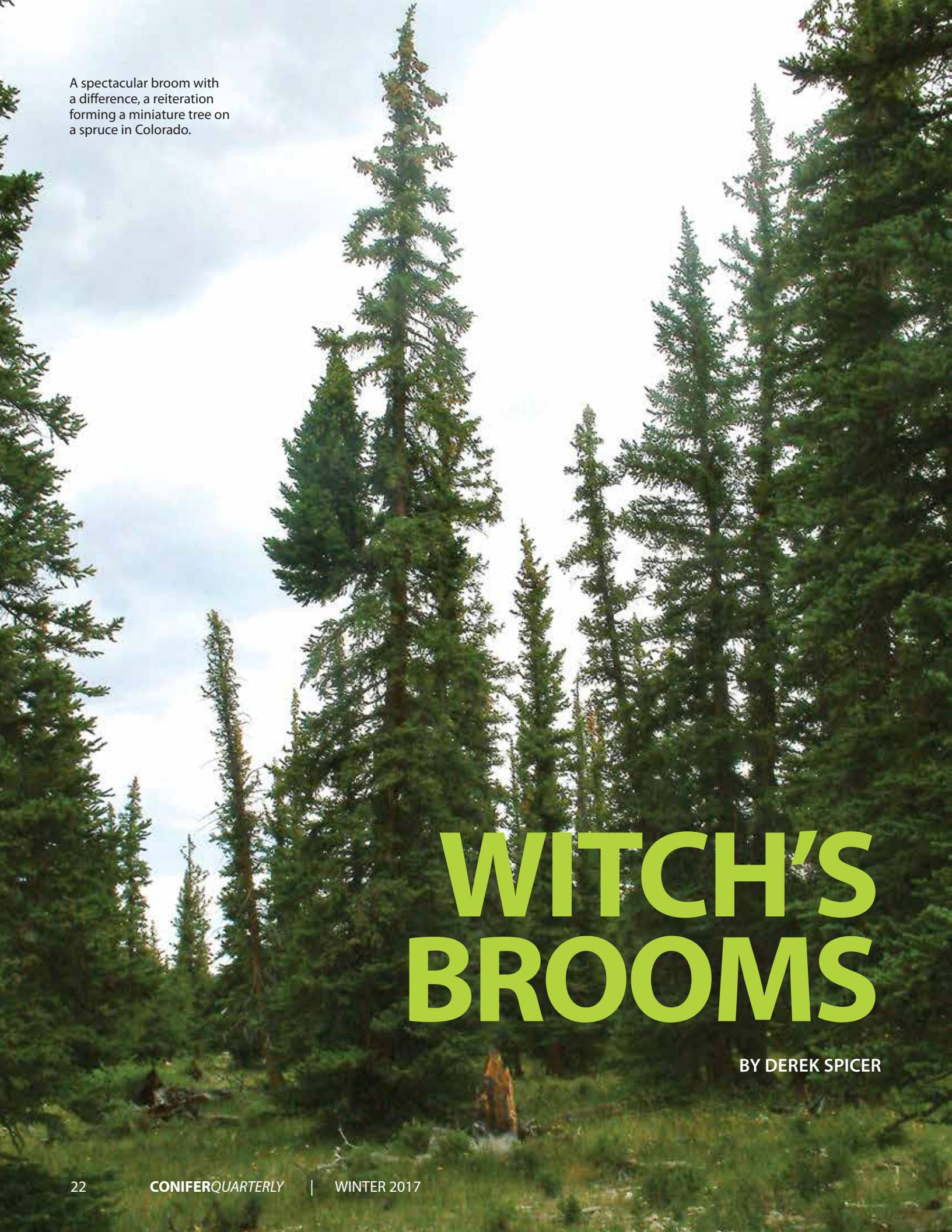
## Addendum

Both Dennis Groh, ACS Past President, and Dr. Bert Cregg, Michigan State University, were consulted on this topic.

It is called "nastic movement", caused from outside stimuli. In this case, the coming of rain increases the humidity. The pines respond by moving the needles up to tighter clusters. This result is called "turgor". The trees are opening their stomata so as to regulate their internal moisture level. ☺

This is part of the photosynthesis process defined in the chemical formula:



A photograph of a forest landscape. In the foreground, there are several tall, thin evergreen trees, likely spruces, with dark green needles. One tree on the left has a prominent, elongated, light-colored growth called a 'witch's broom' on its upper branch. The background shows more of the same tall trees under a sky filled with soft, white clouds.

A spectacular broom with  
a difference, a reiteration  
forming a miniature tree on  
a spruce in Colorado.

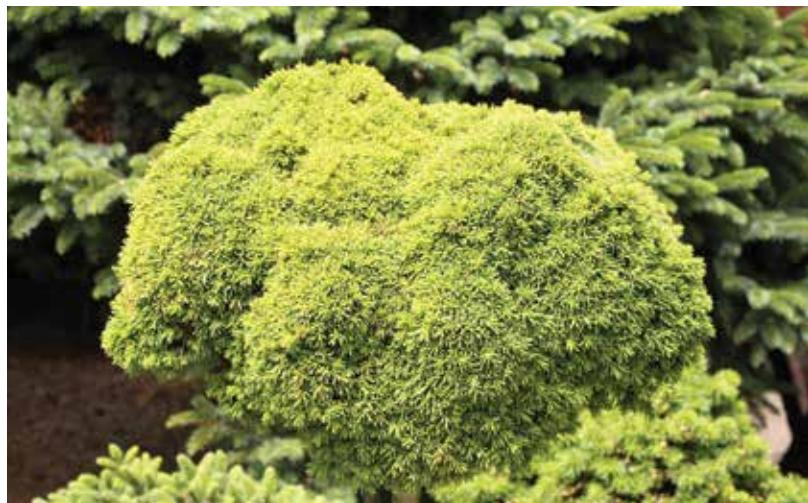
# WITCH'S BROOMS

BY DEREK SPICER

**A witch's broom may be a broom used by a witch in folklore (a Besom) but in its horticultural sense it is more familiar as a diseased or mutated mass of dense deformed twigs and foliage forming a birds nest-like structure in a tree or shrub. They are the source of some of our most choice and beautiful dwarf conifers.**

Normally in plants, especially evident in trees, the leading shoot will produce an auxin, a plant hormone, which will slow the growth of the secondary and tertiary shoots to prevent them from overgrowing it. Interference in this mechanism by mutations or cytokinins (a phytohormone) induced by fungi, insects, nematodes, phytoplasmas, viruses or other outside agencies can cause plant apices to develop into witch's brooms. The fungus *Taphrina betulina* is responsible for witch's brooms on downy and silver birch, and the fir broom rust *Melampsorella caryophyllacearum* stimulates bud formation to produce large numbers of disfiguring deciduous brooms on *Abies concolor* and *A. lasiocarpa* (white and subalpine firs) in the Rockies. A dwarf mistletoe, *Arceuthobium douglasii* induces massive hanging conglomerations of branches on Douglas firs (*Pseudotsuga menziesii*) in California and Oregon. There are many other examples, but we are more concerned in this article with the brooms caused by a genuine genetic mutation in a growing tip, not necessarily the leading shoot. These are likely to be stable and when propagated can make attractive dwarf or colorful new cultivars of horticultural value. Although they can occur in any plant, they are most often associated with conifers.

Witch's brooms in conifers are normally associated with the Pinaceae (*Abies*, *Picea* and *Pinus* in particular). They undoubtedly occur in other genera, but, maybe not so many, or are overlooked. Soft foliaged conifers like *Chamaecyparis* and *Thuja* will rapidly overgrow any mutation and they will be lost if not spotted quickly. Many of these are color variations such as yellow or variegated white on a green plant; they are normally referred to as sports. Growth tip mutations can be color-changing or distorting, but the classic WB is a slow growing or dwarfing cluster of shoots. These obviously start small, and some stay very small, but in favourable conditions, not being shaded out or blown off the tree, they can reach great ages and size. Typically one will see a ball of irregular foliage a foot or two across. Occasionally, they will reach 4–5 (-6 or more) feet across and may be fifty years old. My favorite was a huge broom over a metre across in a Scots pine by the side of a major 'A' road near Bury St Edmunds, Suffolk, England. Obviously, pretty old in 1980, it took a good few years of trying pieces before I managed



The resultant beautiful little plant of *Picea abies* 'Wichtel' about 8 inches across after some 7-9 years.

to get a graft to take. Older brooms are notoriously dry and sometimes difficult to graft successfully. It made a nice little plant, but I am still hoping it will eventually produce little green cones like the ones which studded the parent broom.

Although WB's are not uncommon in the UK, they are more typically found on conifers in countries with more serious mountainous areas. High altitude seems to trigger more brooms, as you might expect from higher solar radiation causing more mutations. One can drive around in the mountains of Colorado above 8,000 feet and see a broom or two in the roadside conifers every 328 feet. Getting at them is another matter. The best are always out of reach. In the early days, legend has it, that the European collectors would blast the brooms down from high in a tree with a shotgun, a practice continued today in the States.

There have been collectors of WB's for a long time now, but I suspect the early ones were only on a casual basis because of time and transport limitations in the early 1800's. More recently, in the last thirty or so years, collecting became more intensive and has started to produce a new generation of really dwarf plants which will eventually be so useful as genuine miniature trees in rock garden work and the smaller gardens of today. There are three main areas of the world where WB's are being hunted; The Rocky Mountains and Cascade Ranges in the USA and central Europe. There are some, questionably obsessive, collectors of WB's who seem to have spent a large part of their lives in the mountains hunting for ever slower growing little plants. Some have found and named or listed over a thousand WB's and entered conifer folklore: Jerry Morris from Colorado is one, mostly collecting brooms on *Abies lasiocarpa*, *Picea engelmannii*, *Pinus flexilis* and *P. contorta*, all at fairly high altitude. In Europe, German, Czech and Polish collectors are combing the Alps and especially the Tatra Mountains for *Picea abies* and *Pinus mugo* brooms. This is where the really tiny dwarfs seem to be coming from.



An unnamed graft  
only 5cm across  
from a tiny WB  
consisting entirely of  
buds only.

Newly discovered brooms in the wild and the subsequent grafts from them are often numbered with a hash number. So, if 9 different brooms have yielded scions in a particular area, they will be numbered #1 to #9. The prime example is the San Seb(SS) series of up to 1,000 numbers given to dwarf plants from different brooms collected by Milan Halada and Jan Beran from trees of *Pinus mugo* subsp. *rotundata* in the San Sebastian region of northern Bohemia (Czech Republic). One suspects that there must inevitably be some duplication with the same mutation occurring more than once. Many will fall by the wayside, but the best will be named and propagated; SS #25 is a choice tight dark green bun now named *P. m. subsp. rotundata* 'Beran'. The finder usually coins the name, which accounts for some wonderfully eccentric ones. Names are often given after the place of origin. One of the most informative and nicest is *Pinus flexilis* 'Tioga Pass' (above Yosemite National Park), a wonderfully evocative place if you have ever been there. The wild brooms themselves are sometimes labelled to ensure they are not collected from on multiple occasions by another collector or two. It is important to take only a small part of the broom and leave some scion wood for another year in case of failure.

Brooms can occasionally be propagated by rooting cuttings, *Picea abies* in particular, but normally they have to be grafted. The normal compatibility rules apply: *Picea* scions onto *Picea abies* rootstocks, sometimes *P. sitchensis*, *Abies* onto *A. alba* in the past, but mostly onto *A. koreana* nowadays. Five needle pines onto *P. wallichiana* or *P. armandii*, *P. strobus* having fallen out of favour due to plants "miffing off" in our mild damp climate. Two needle pines onto *P. sylvestris*, *P. mugo* or *P. mugo* var. *rostrata*. Knowing the origin of the stocks may be important when it comes to siting plants: We received part of a beautiful Scots pine broom from near Madrid, Spain with the comment that it would be a very good plant for a hot dry climate. Maybe it would, but we graft it onto Scots pine rootstocks sourced from a Northern Scottish clone so that its roots will be happy in our long damp UK winters.

Some species are very prolific; others rarely produce WB's. The European mountain pine, the *P. mugo/P. uncinata* complex, has thousands of different dwarf "cultivars" derived from wild collected brooms, but there are hardly any named ones of *P. pinaster* in spite of the millions of trees around the Mediterranean.

One novelty source of new WB's is to find them on existing dwarf conifers. It's perhaps not so surprising as the plant must already have had a propensity for mutating. Mature plants grown from WB's sometimes start to produce cones with viable seed. Even smaller plants have been grown from them.

The Victorian desire for little trees to complement their Lilliputian rock garden landscapes started them looking for new, dwarf, cultivars. Some were selected slow growing seedling mutations, but many were propagations from WB's. Their penchant for collecting things also fuelled the quest for more variety and ever more dwarf plants, aided by interest from Continental nurserymen, a craze that is continued today. The best example was seen in the world's reputed earliest rock garden at Lamport Hall, Northamptonshire, dating from 1820, which, in about 1980, had two specimens of *Picea abies* 'Pygmaea' which had reached over two metres after an estimated 140 years (now, sadly, removed). These were almost certainly derived from a WB, as was the other classic example; the earliest recorded dwarf conifer; *Picea abies* 'Clanbrassiliana'. Planted by Lord Clanbrassil in 1798, the original is still alive in Tollymore Park, Newcastle, County Down, Northern Ireland. The illustration shows one of its earlier plantings growing at Eastnor Castle, Herefordshire. It is now a 17 feet specimen after about 150–200 years. A point that should be noted by all those who ask "How big does it get" when contemplating buying a dwarf conifer. A similar, highly recommended, dwarf pine arising from a WB which has been around for many years, and many will be familiar with *Pinus sylvestris* 'Beauvronensis'. A fine example of an old specimen can be seen in the Heather Garden at Saville, Windsor Great Park, England. Although slow, it is now over 17 feet high. There is a tendency for dwarf or slow conifer cultivars derived from WB's to grow faster over the years as the now missing leading shoot growth hormone inhibition has less effect. These large

ancient specimens have obviously outgrown their miniature tree status even though fresh propagations from them would remain useful slow growing little trees for many years. It illustrates why even slower growers were, and are still, sought after.

One of the main objectives of WB collectors today is to find the slowest growing WB to produce the tiniest little plant. The limit seems to have been reached by the discovery of more than one broom consisting of simply a tight cluster of buds with no shoots. You would expect a real carpentry problem grafting a small piece, but to their credit they seem to find ways. The most enthusiastic collectors are not concerned with aesthetics and will usually graft slightly higher on the stock (6–9 inches) than looks right. This produces an ugly little lollipop which is easier to keep clean and weed-free, but can take many years to grow into a shapely object of desire for the garden. Having said that, deliberately grafting slightly larger growing, but still dwarf, pines and piceas onto a rootstock at 20–30 inches can produce a really attractive novelty dwarf plant on a stem which can add height and interest to a rock garden or trough, while allowing the under-planting of alpines. Normally, one would graft as close to ground level as possible, to form a better plant and partly to hide the graft scar. Most WB's will form a bun with varying degrees of tightness, many very attractive, when propagated. Personally, I prefer a miniature tree, with a visible trunk and some "architectural" qualities along the lines of the original Victorian concept. Either way, the best are ideal for troughs and really miniature gardens or garden railways and can do away with trimming for many years!

For the future, there will soon be a new generation of more dwarf pines and spruces than were available in the past. Typical is *Pinus mugo* 'Meylan' a WB found on a plant of the old favorite "dwarf" *Pinus mugo* 'Mops' which nowadays tends to get too large. There are many more of these lovely neat little dwarf buns to come, look out for

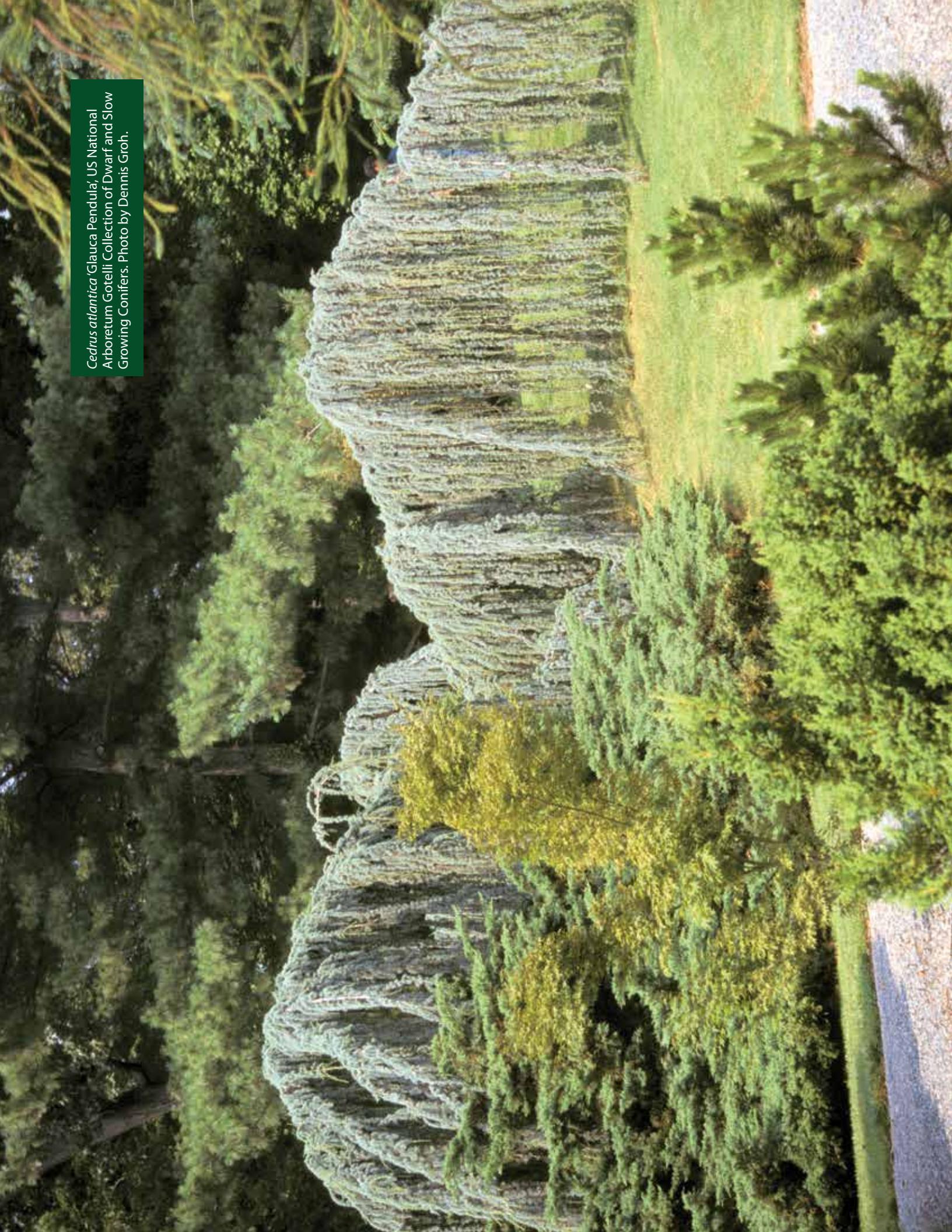


A creamy sport  
on *Chamaecyparis obtusa* 'Tsatsumi'

them in the more specialist nurseries and eventually the garden centers, but don't expect to find all the names in the literature though. Not all the plants derived from brooms are just dwarf with little colour variation; there are some good, bright yellow, little pines and dwarf blue spruces or oddly shaped novelties as well. Examples of plants for the future would include *Picea pungens* 'Bali' and 'Porcupine', the two little plants illustrated are growing in Jan Beran's Czech garden from WB's found in the States. There are many more of these really dwarf blue spruces slowly becoming available. *Pinus contorta* 'Frision Gold' found as a WB before 1962 by the Zu Jedelloh nursery is an example of a golden yellow pine. There are quite a few more, mostly *P. mugo* forms, many much smaller and neater to come in the next few years. A really stunning plant slowly becoming available is *Abies koreana* 'Kohouts Icebreaker'. This was found as a WB on a plant of the already popular *A. koreana* 'Silberlocke'. Many of you will be familiar with the bright creamy white of the recently introduced pyramidal *Picea glauca* 'Daisy's White'. For the real enthusiasts there is now a more dwarf little globe of cream, *P. glauca* 'Jalako Gold' which was found as a tiny Witch's broom on a plant of 'Daisy's White'. It will be scarce for many years.

A note of caution, selecting from all the thousands of Witch's brooms can take many years of evaluation and deciding whether a plant is good enough or different enough to be named and propagated. Time moves slowly in this world though and, even after that, it takes many more years to multiply up enough stock and bring something new to the gardening public. Some, especially the dwarf and choice, will always remain as collectors' items because there is a limit to the number of scions available every year from a dwarf, slow plant producing only a few tiny branchlets. The slightly larger growers stand a chance of being commercial and setting plants onto the garden centre benches twenty or more years after being found.

A discussion of the various spellings of Witch's Broom (Witches' Broom, Witch'es- broom etc.) is for another article but a learned explanation can be found in the British Conifer Society Journal, Autumn 2015. [❶](#)

A photograph of a dense, narrow column of weeping cedar trees (Cedrus atlantica 'Glauca Pendula'). The trees are trained to grow in a tight, vertical cluster, creating a dark green, almost black, wall of foliage. The branches hang down, giving them a weeping appearance. They are set against a bright, sandy-colored ground cover, possibly gravel or light-colored soil, which provides a strong contrast to the dark green of the trees.

*Cedrus atlantica* 'Glauca Pendula', US National  
Arboretum Gotelli Collection of Dwarf and Slow  
Growing Conifers. Photo by Dennis Groh.

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