

We also have a plant named *Picea abies virgata*, commonly called Snake Branch Spruce or Foxtail Spruce. Visitors tell me that this plant is used for timber in its native stand and I can see why by looking at the long leader that it sends up.

I find it very ornamental. We propagate it by grafting it on *Picea abies* understock. We have never tried to root it. We have noted that by using terminal branches as scions we get a plant exactly like the mother plant. By using a weak, pendulous side branch we get different forms of weeping spruce. So now I have a question in my mind. Are the many forms of the Weeping Norway Spruce that we have, mutations or are they results of using scions of the lower portion of *Picea abies virgata*?

MODERATOR HANCOCK: Thank you for an interesting talk Joe. We certainly won't lack for humor as long as we have such people as you in the Society. The next speaker is a well-known and well-loved member. The soul of the nursery is the propagation department but I'll have to say that the soul of the Morton Arboretum is our good friend, Roy Nordine, and Roy is one of our charter members.

DWARF CONIFERS

ROY M. NORDINE
The Morton Arboretum
Lisle, Illinois

What is a dwarf conifer? There are several definitions of this term and all are valid. The accepted one includes all low and slow growing evergreens. Since there are exceptions to all rules many of the low growing junipers are not slow growing. Several forms of prostrate type *Taxus* are also rapid growing. A great many of the slow growing conifers continue this manner of growth until they are large or much larger than what we accept as a dwarf conifer.

The customer, the consumer of our products, will define a dwarf conifer as any plant that will remain small. How small he doesn't know, except he is concerned with a foundation planting that will not eventually hide his house, nor block out the entrance to the house.

Another definition is a natural one—what does nature define as a dwarf conifer? Mugho Pines in their native state range from low, nearly prostrate plants to some 30 feet tall, while the adjacent Austrian Pines will grow to 120 to 150 feet high. Nature has defined Mugho Pines as a dwarf form and except for selected clones hardly a species for a foundation planting.

The Morton Arboretum has defined "dwarf" as any plant that remains below five feet. A dwarf plant collection was begun about ten years ago to include any plant that will remain below this arbitrary height.

Dwarf forms appear in several ways. The Japanese have created a cultural method for maintaining any plant in a dwarf condition. This practice is not considered in this presentation. Most dwarf forms have appeared as chance seedlings in the nursery, or in native areas. Some are propagations from witches brooms, and others are seedlings from fruiting witches brooms. Others have arisen as bud sports or variations in vegetative propagation.

There are a great many dwarf horticultural forms, and they can be found in every genera of conifers. The list is too long for the brief period of time allotted for this presentation. Whatever kind of dwarf conifer you may need, can usually be found with a little searching.

There are several very fine and extremely interesting collections of dwarf conifers in the eastern states. The largest collection is the Gotelli group at the National Arboretum. The oldest is probably the Montgomery collection at the New York Botanical Garden. The Arnold Arboretum has recently built a very attractive one on a hill near the greenhouse.

Several very excellent books on conifers are available, the latest being "Dwarf Conifers" by H. J. Welch, an English author, and published by Faber and Faber in 1966.

Juniperus chinensis Pfitzer—Armstrong
Armstrong Pfitzer

A number of selections of Pfitzer Juniper have appeared in the trade. This form is slow of growth, matures at about 3 feet high and retains a good green color at all times. This plant was 20 years old when the slide was taken.

Juniperus chinensis Pfitzer Kallays
Kallays Compact Pfitzer

Of all the selections of Pfitzers this form is the most compact and smallest at maturity. There are two plants in this slide; the plants are 25 years old.

Juniperus chinensis Sargentii
Sargent Juniper

The true form was introduced to this country by C. S. Sargent from northern Japan in 1892. This plant is often confused with *Juniperus procumbens*. An excellent prostrate type plant, that can be staked as small plants to increase height and make mound-like plants to 3 feet high.

Juniperus horizontalis alpina

Nearly erect branches to 3 feet high are produced, gradually becoming creeping. Plants grow rapidly making large mats in a short time. This plant should have great value on bank areas for erosion control.

Juniperus virginiana pendula

There are several forms of Weeping Red Cedar; this is the better form where all branches are weeping. This was

grafted low and trained to a stake. The slide is of a plant grafted 8 years ago.

Larix decidua pendula

A weeping form of European Larch in its bronze yellow fall foliage. The plant in the slide was grafted at the soil line and tied to a stake. It can also be grafted on standards. This plant is 12 years old and each winter pruned severely for scion wood.

Picea abies echinaeformis
The Hedgehog Norway Spruce

A very dwarf and slow growing plant which is cushion-shaped. Frequently strong shoots are produced that have long, stiff and prickly needles, hence the name. From a plant in the New York Botanical Garden.

Picea abies Gregoriana

The plant in the foreground is Gregoriana. A very dwarf form, cushion or globose in shape rarely exceeding 2 feet in height. Slide taken at the Bayard Cutting Arboretum.

Picea abies microsperma
Small Cone Spruce

A dense, broadly conical or rounded and growing more rapidly than other forms. This plant is 22 years old.

Picea abies nidiformis
Nest Spruce

A dwarf spreading type, wider than high, and gradually forming an inverted cone in the top of the plant. This plant is 34 years old.

Picea abies parviformis

A broadly pyramidal form of Norway Spruce. This plant is about 35 years old.

Picea abies pendula
Weeping Spruce

There are two forms of Weeping Norway Spruce, namely, 'pendula' and 'inversa'. This is the variety *pendula*, with spreading pendulous branches and branchlets. In the form 'inversa' the branches and branchlets hang down along the main stem or the trunk. The plant in the slide is 38 years old.

Picea abies procumbens
Prostrate Spruce

One of several prostrate types of Norway Spruce. The mature spread and height is not known, and they develop into broad and flat plants. The slide is of an older plant at the New York Botanical Garden.

Picea abies pygmaea
Pygmy Spruce

A low, broadly globose form, much wider than high. This plant was 28 years old when the slide was taken.

Picea abies Remontii

A dwarf conical, very dense plant of moderate growth. The plant on display is about 25 years old.

Picea abies repens
Creeping Spruce

Low and prostrate with procumbent and arching branches. This 9 year old plant is 2 feet high and 3 feet wide.

Picea abies virgata

Almost every horticultural form of plant can be found in Norway Spruce. This is one of two forms with long slender branches and very few branchlets.

Picea glauca conica
Dwarf Alberta Spruce

This plant was found in Alberta by J. G. Jack in 1904 as a single dwarf plant. A dense, slow growing pyramidal plant that is available from a few nurseries. This plant on the slide is about 20 years old.

Picea glauca pendula
Weeping White Spruce

A friend of Arthur Hill found this plant in the wild in Ontario and sent a few scions to the D. Hill Nursery Co. This 10 year old plant is 6 feet high.

Picea mariana Beissneri

A slower growing but wide and bushy form of Black Spruce. This plant is 6 years from a graft. The next slide is a much older plant at the New York Botanical Garden.

Picea mariana Doumetii

A form of Black Spruce that develops into wide spreading, dense and bushy plants, but maintaining a leader. This slide shows a 4 year old plant in the nursery.

Picea Omorika nana
Dwarf Siberian Spruce

A globose to conical plant with the green and silvery attractive foliage of Siberian Spruce. This plant is 8 years old from a graft.

Picea pungens glauca compacta

There are several dwarf compact forms of Blue Spruce, all are very similar in color, and growing habits. The Montgomery plant closely resembles this form. Leaders are developed so a broad conical-shaped plant forms. This 12 year old plant is 3 feet high and 4 feet wide.

Picea pungens R. H. Montgomery

A dwarf form of Blue Spruce from the Montgomery Collection at the New York Botanical Garden. This plant was

found in the Eastern Nurseries as a chance seedling. The slide made in 1954 may show the original plant.

Picea pungens pendula
Kosters Weeping Blue Spruce

L. H. Bailey in "The Cultivated Evergreens" claims this is the true Koster Spruce, having been introduced by the Koster Nursery, Boskoop, Netherlands in 1895. It is curiously formed with somewhat prostrate, sometimes ascending, but chiefly pendulous branches. The large plant is now 44 years old, and smaller plants are 10 years old.

Picea pungens procumbens

There are several prostrate forms of Colorado Blue Spruce. This slide is of a plant in the New York Botanical Garden.

Picea Wilsonii

Wilson's Spruce is usually listed as a dwarf, or a dwarf form of Wilson's Spruce, but there is no dwarf form; they are all of slow growth. Native to the mountains of Central China it grows to 80 ft. This plant is 32 years old. The next slide is a Wilson's Spruce, now 22 years old from a cutting.

Pinus aristata
Bristol Cone Pine or Mealy Bug Pine

This plant has resin on the needles. A plant native to the Rocky Mountains from Colorado to Arizona. Of irregular growth from semi-prostrate to bushy forms to some tree-like specimens. The first slide is a plant in the Morton Arboretum collections. The second slide shows a plant near Denver.

Pinus densiflora globosa
Japanese Globe Pine

A dwarf, spreading globe-like form of Japanese Red Pine. This form is rare and distinctly different from the *P. densiflora umbraculifera* which is available in the trade. The slide shows a 5 year old plant that is wider than high.

Pinus densiflora pendula

A weeping form of Japanese Red Pine. This plant can be grown as a prostrate form or trained to a stake as a weeping form. The plant on the slide is a 4 year old graft.

Pinus densiflora umbraculifera
Japanese Umbrella Pine

This is the Tanyosho of the Japanese. This form is fairly well known, especially as a younger and small plant. Our plant is 40 years old and is about 15 feet high and a bit wider than high.

Pinus mugo mughus
Mugo Pine

The slide shows the variations found in a seedling population. These plants are 30 to 40 years old.

Pinus mugo compacta

Many forms of Mugo Pine are found among seedlings. The search for compact low forms is continuous. The slide shows the type that most nurserymen are looking for. Grafting would be the only sure way of reproducing this particular form.

Pinus nigra Hornibrookiana

A low somewhat spreading shrub-like plant originating as a witches broom on an Austrian Pine in the Rochester Parks. The slide is of an old plant; it may be the original plant in Durand Eastman Park, Rochester, N. Y.

Pinus nigra pygmaea

A dwarf slow-growing globose form of Austrian Pine. The average annual growth is 3-4 inches. This 14 year old plant is 4 feet high.

Pinus strobus densa

A dwarf globe-like form of White Pine and more regular in growth than other dwarf forms. This plant is 25 years old.

Pinus strobus nana

Another dwarf form of White Pine. As it matures it becomes somewhat irregular in growth. This plant is about 25 years old.

Pinus strobus pendula

Weeping White Pine

All plant forms can also be found among Eastern White; this weeping form is a fine example. Long pendulous branches appear from vigorous growing shoots each year, eventually forming an irregularly shaped plant. The plant in the slide is 25 years old.

Pinus sylvestris Albyns

A prostrate form of Scots Pine found in the Albyns Nursery, Newark, Ohio. This plant is 3 years old from a graft.

Pinus sylvestris Beuvronensis

A dwarf and spreading bushy form of Scots Pine with dark green needles and slow growth. Originated in a witches broom at a nursery near Orleans, France. This is a 4 year old plant.

Pinus sylvestris Grand Rapids

Another prostrate form of Scots Pine found in a plantation of Scots Pine in the Parks Department of Grand Rapids, Michigan. This is a ten year old plant from a graft.

Pinus sylvestris fastigiata

Columnar Scots Pine

All forms or shapes of plants can be found among Scots Pines. Ascending branches forming a narrow pyramidal head. This plant is 20 years old.

Pinus sylvestris nana

A dwarf and slow growing tree-like plant of Scots Pine. This plant is 9 years old from a graft.

The second slide is a much older specimen at Durand Eastman Park in Rochester, from which our plant was taken. The name we use here does not fit the description given in the literature for *P. sylvestris nana*.

Pinus sylvestris Watereri

A dense broadly columnar form becoming globose with age. Needle color is an attractive steel blue shade. This plant makes moderate growth of six inches a year and may not be considered a dwarf conifer. The plant on the slide is 30 years old and as wide as high.

Pseudotsuga menziesii nana

A dwarf and very slow growing globe-like Douglas Fir. This plant is 32 years old.

Taxus baccata repandens

A low and prostrate form of the English Yew. Perhaps too much emphasis is placed on the Japanese group to the exclusion of this excellent form. It is satisfactory in our area with winter protection. Planted in full sun on the north side of other evergreens it becomes 3-4 feet high. These plants are 20 years old.

Taxus cuspidata

A form of Japanese Yew with a narrow yellow line on the edges of the needles. Brought from Japan in the 1860's by Dr. Hall and located on his estate in Bristol, Rhode Island. This slide illustrates what a slow growing plant may become with maturity.

Taxus cuspidata aurea

A golden leaf form of Japanese Yew on the Hall Estate, Bristol, Rhode Island. Probably brought back from Japan in the 1860's by Dr. Hall.

Taxus cuspidata densiformis

The very well known dwarf Japanese Yew. This is the irregular growing form (frequently called nana), retaining this character into maturity. It makes 5-6 inches of growth a year and is now 3½ ft. high and 16 years old.

Taxus cuspidata nana

Dwarf Japanese Yew

The difference between *densiformis* and *nana* is the manner of growth. *Nana* does not have the bunchy type of needles and twig growth, and the general appearance is a regular rounded or semi-globose shrub. This 15 year old plant is 6 feet wide and 3½ to 4 feet high.

Taxus cuspidata nana pyramidalis

We are not sure of the correct name of this form. It bears the name given by a local nursery from whom we received the original plants. The dark green lustrous foliage suggests its relation to a media hybrid. Very dense growth and more columnare than pyramidal, it averages about 4 inches of growth a year. This plant is 25 years old from a cutting.

Thuja occidentalis Hetz
Hetz Midget

Found in the nurseries of the Fairview Evergreen Nursery Co., this is correctly a dwarf form of our common American Arbor Vitae. This plant is now 15 years old.

Tsuga canadensis pendula
Weeping Canadian Hemlock

There are several forms of this weeping type—two from the original selection and a number that have been raised from seed. They all show some difference in mature form. This plant is on an estate in Bristol, Rhode Island. The person who lends scale to our plant is our member, Alfred Martin. The age of this plant is a guess probably 75 to 80 years old.

MODERATOR HANCOCK: Thank you Roy for that straight, clear and well informed presentation of dwarf evergreens. For our last speaker we have a versatile and widely traveled individual, Mr. Albert G. Johnson who will talk on "Pine dwarf segregates from witches brooms."

PINE DWARF SEGREGATES FROM WITCHES'-BROOMS¹

ALBERT G. JOHNSON, SCOTT S. PAULEY
AND WILLIAM H. CROMELL²

This report on the recovery of dwarf seedlings from seed collected from pine witches'-brooms goes back to 1946 and an initial observation of small but mature and apparently otherwise normal cones borne by a witches'-broom in a jack pine (*Pinus banksiana* Lamb.) tree in Douglas County, Wisconsin. The broom was large, about six feet in diameter and terminal in position.

Witches'-brooms, while not common in pines, are such conspicuous objects as to be frequently reported. They have been observed in nearly all our North American species. They are also known to occur in this country on the European Scot's pine (*Pinus sylvestris* L.) and Austrian pine (*P. nigra* Arn.) and are reported frequently in European literature.

A small quantity of seed obtained from a sample of cones of the above tree was planted in 1950. The surviving popula-

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²Research Fellow, Department of Horticultural Science, Professor and Instructor, School of Forestry, University of Minnesota, respectively