

32. Vuyk, Aart. 1956. Mass production of forest tree seedlings. Proc. Plt. Prop. Soc. 6: 24-30.
33. Wakeley, Philip C. 1954. Planting the southern pines. U. S. Forest Service. Agriculture Monograph No. 18.
34. Wells, James S. 1955. Grafting pine and spruce. Amer. Nurseryman 101 (1): 15, 16, 54-59.
35. Zak, Bratislav. 1955. The grafting of shortleaf and other pine species. Southeastern For. Expt. Sta. Paper No. 59.
36. Zak, Bratislav. 1956. Experimental air-layering of shortleaf and loblolly pine. Southeastern For. Expt. Sta. Paper No. 69.
37. Zak, Bratislav. 1956. Experimental air-layering of shortleaf and loblolly pine. Southeastern For. Expt. Sta. Paper No. 73.
38. Zak, Bratislav and R. G. McAlpine. 1957. Rooting of shortleaf and slash pine needle bundles. Southeastern For. Expt. Sta. Research Notes No. 112.

MODERATOR O'ROURKE: I will now ask Mr. Roy Nordine to present his portion of the program.

SOME UNUSUAL PINES

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The genus *Pinus* contains about 70 species that range throughout the Northern Hemisphere from the Arctic Circle to Mexico, the West Indies, and North Africa. This genus is the largest and most important of the coniferous group. They have long been very useful and valuable plant material for both large and small plantings, and unlike spruces and firs, their beauty increases with age, and they become more picturesque.

The usual plant forms, such as prostrate, globe, spreading, dwarf umbrella-like, columnar, pyramidal, weeping, and colored foliage are found in about a dozen species. Occasionally a new plant is found.

There are four very excellent books on conifers. One is by Murray Hornibrook: DWARF AND SLOW GROWING CONIFERS, published in London in 1923. This book lists and describes many forms that were found in Europe and now do not exist or, because of quarantine regulations, were never brought to this country. Another equally fine book is L. H. Bailey's CULTIVATED EVERGREENS, published in 1925. This book also contains a number of dwarf forms that have now apparently been lost. Two later books are CONIFEREN by Peter den Ouden, published in Holland in 1949; the text is in Dutch. And the latest

book is DIE NADELGEHOLZE by Gerd Krussmann, published in Germany in 1960; the text is in German.

The largest single collection of dwarf conifers in the entire world is owned by William Gotelli, 66 Crest Drive, South Orange, N. J. In this collection each plant is handsomely displayed as though it were a rare jewel.

The following is a record and brief description of all the unusual pines now known in this country plus a finding list for the various plants.

Pinus banksiana Dwarf. Plant at Arnold Arboretum found by Albert G. Johnson in 1954; plant at that time a small, dense, dwarf pyramid, making short annual growth. About 2' high.

Pinus banksiana Weeping. Plant at Richfield, Minnesota, found by Albert G. Johnson in 1959. Plant probably 5' high on a stem about 3" in diameter, with weeping branches that almost reach the ground.

Pinus cembra columnaris Beiss. A form of narrow columnar habit; a large old plant at Morris Arboretum.

Pinus densiflora oculus-draconis Mayr. Each leaf marked with two yellow bands; if seen from above, show alternate yellow and green rings; therefore the name, meaning "dragon's eye". Plant at Morris Arboretum.

Pinus densiflora globosa Mayr. A dwarf form of globose habit. Our plants, now 35 years old, are 12' high with a flat top.

Pinus densiflora pendula Mayr. Weeping Japanese Pine. A form with pendulous or prostrate branches. Good specimen at Huntington Botanical Garden, San Marino, California.

Pinus densiflora umbraculifera Mayr. Japanese Umbrella Pine, the Tanyosho of the Japanese. Dwarf, dense form, becoming 12' tall with spreading branches, forming an umbrella-like head. Found in most arboreta.

Pinus griffithi zebrini. Long leaves with two broad yellow bands, similar to *P. densiflora oculus-draconis* and *P. thunbergi oculus-draconis*. Plant at Morris Arboretum, Philadelphia.

Pinus flexilis fastigiata. Found by Robert E. Moore in 1946 at Hot Sulphur Springs, Colorado, 9000 ft. elevation. Tree was 50' high, 8-10' wide, 10" diameter trunk. Small plants now at the D. Hill Nursery that were grafted about 1948 on *Pinus flexilis* are now 3-4'.

Pinus heldreichii aureospica. Low globe-shaped, to 9' high, needles remaining yellow at their tips. Introduced to the trade about 1955 by Hesse Nursery, Germany. Plant at Plant Introduction Station, Glenn Dale, Maryland.

Pinus mugo compacta Slavin. A dwarf, slow-growing, compact plant, with a flat top; it is several times wider than tall. Plant at Arnold Arboretum and Morton Arboretum.

Pinus mugo slavini. A dwarf, compact, dense, and slow-growing plant, becoming round and mound-like. Old plant in Durand Eastman Park, Rochester, about 3' high and 4' wide.

Pinus nigra globosa. A slow-growing plant developing with several stems into a globe-like plant. Morton Arboretum has several plants of various ages; also at Morris Arboretum.

Pinus nigra hornibrookiana. Dwarf, compact, slow-growing, and mound-like plant, twice as wide as high. Old plant in Durand Eastman Park, Rochester, New York, about 3' high, 6' wide.

Pinus nigra monstrosa. A tall plant with a narrow form; the lower 2/3 of the tree has branches that extend horizontally or deflect downward; the upper 1/3 has normal growth pattern. A large plant in Durand Eastman Park, Rochester.

Pinus parviflora nana Carr. A plant with a few short and erect branches, making a small, flat-topped bush. Reported by Andrew Leiser.

Pinus ponderosa pendula W. H. Sarg. Tall-growing, like the species, with drooping branches. An odd-shaped plant. A fine old specimen in Durand Eastman Park, Rochester, N. Y.

Pinus pumila Regel. Dwarf Stone Pine. Shrub to 4' high with the main branches usually prostrate; from high mountains of Korea and Japan. Does not succeed under cultivation in this country.

Pinus resinosa Narrow Upright. Plant at North Lake, Wisconsin, by Albert G. Johnson, 1955; young plant about 6' high, very narrow. All branches ascending, plant about 18" wide at base.

Pinus strobus densa. A dwarf, compact, and very dense, slow-growing plant, becoming a rounded plant. Morton plant dates from 1940.

Pinus strobus fastigiata Beiss. A form with ascending branches forming a narrow-pyramidal or nearly columnar head. Becoming wider with age. Morton plant bought in 1937.

Pinus strobus nana Knight. Dwarf White Pine. A dwarf, compact round bush with short leaves. A neat and handsome form. Arnold and Morton, dates from 1937. Morris Arboretum has an old plant.

Pinus strobus Ontario. A dwarf and mound-like plant with short needles (1½") height 28", spread 46". Found in a seedling block of White Pine in Durand Eastman Park on Lake Ontario, Rochester Parks.

Pinus strobus pendula Beiss. Needles of typical length, but branches are long and truly pendulous, bending down with tip ends turning upward. Plant gradually becomes taller, but of most odd and irregular form. Morton plant bought in 1937.

Pinus strobus umbraculifera Carr. Dwarf and dense, of slow growth, forming a wide globe-formed plant. Plant at Arnold Arboretum about 3' high and 5' wide.

Pinus sylvestris fastigiata Carr. With ascending branches forming a narrow columnar plant. Most arboretums have plants.

Pinus sylvestris Grand Rapids. Found by C. E. Morris in a Scots Pine planting on park land of Grand Rapids, Michigan. Original plant about 4' wide and about 15" high; a dwarf form with prostrate branches and good green color.

Pinus sylvestris nana Carr. A dense, slow-growing plant with a central leader, and pyramidal in form; needles are steel blue. Old plant in Durand Eastman Park, Rochester, is about 6' high and 4' wide.

Pinus sylvestris watereri. Waterer Pine. Dense, slow-growing, globe-like in form, steel blue needles. Large plant at Morton Arboretum now 38 years old; 10' high, 15' dia.

Pinus thunbergii oculus-draconis Mayr. The leaves are marked with two broad yellow bands similar to the variety by this name in Pinus densiflora. Plant at Rochester Parks and Morris Arboretum.

A List of Unusual Pines
and
Where They May Be Found

Pinus albicaulis nana #3
banksiana dwarf #11
banksiana weeping #11
cembra columnaris Beiss #3, 5
cembra sibirica Loud. #1, 3
contorta latifolia prostrata #3
densiflora aurea Mayr. #3, 6
densiflora globosa Mayr. #3, 5, 8
densiflora oculus-draconis Mayr. #3, 4, 5
densiflora pendula Mayr. #1, 3, 6, 9
densiflora umbraculifera Mayr. #1, 2, 3, 4, 5, 6, 9, 10
flexilis fastigiata #13
flexilis pendula #3
griffithii zebrina #3, 5
heldreichii aureospica #3
heldreichii leucodermis (Ant.) Markgraf & Fitschen #1, 3-6
kwangtungensis Chun & Tsiang #12
monticola pygmaea #3
mugo compacta slavina #1, 3, 5, 8
mugo mughus (Scop.) Zenai #1

Pinus mugo pumilio (Haenke) Zenai #1
mugo rostrata (Ant) Hoopes #3, 5, 6, 8, 10, 12
mugo rotundata Hoopes #1, 2, 3, 6, 8, 10
mugo slavini #3, 6, 8, 9
nigra globosa #3, 5, 10
nigra hornibrookiana #1, 3, 6, 8, 12
nigra monstrosa #3, 6, 8
nigra pendula Rehd. No source.
nigra prostrata Rehd. No source.
nigra pygmaea Rehd. #3, 6
parviflora nana (Beiss.) Carr. #3
ponderosa pendula H. W. Sarg. #3, 6, 8
pumila Regel #3, 9, 12
resinosa narrow upright #11
strobis brevifolia Loud. #1
strobis contorta #1
strobis densa #3, 6, 8
strobis fastigiata Beiss. #1, 2, 3, 4, 6, 7, 8, 10
strobis nana Knight #3, 4, 5, 6, 7, 12
strobis ontario #8
strobis pendula Beiss. #1, 3, 4, 6
strobis prostrata Maat. #3
strobis umbraculifera Carr. #1, 3, 6
sylvestris aurea Beiss. #3
sylvestris beuvronensis Transon #3
sylvestris fastigiata Carr. #2, 3, 4, 6, 8, 12
sylvestris Grand Rapids #6, 14
sylvestris nana Carr. #3, 4, 6, 8
sylvestris pendula Carr. No source.
sylvestris pumila Beiss. #1, 3
sylvestris watereri Beiss. #2, 3, 4, 6, 8, 10
thunbergii oculus-draconis Mayr. #3, 4, 5, 8

#1 Arnold Arboretum, Jamaica Plain 30, Mass.
 #2 Dominion Arboretum, Ottawa, Ontario, Canada
 #3 Gotelli Arboretum, 66 Crest Drive, South Orange, N. J.
 #4 Holden Arboretum, Mentor, Ohio
 #5 Morris Arboretum, Philadelphia 18, Pa.
 #6 Morton Arboretum, Lisle, Ill.
 #7 National Arboretum, Washington 25, D. C.
 #8 Park Department, Rochester, N. Y.
 #9 Strybing Arboretum, San Francisco 17, Calif.
 #10 Scott Horticulture Foundation, Swarthmore, Pa.
 #11 University of Minnesota Arboretum, St. Paul 1, Minn.
 #12 University of Washington Arboretum, Seattle 5, Wash.
 #13 Hill Nursery, Dundee, Ill. Have stock plants - none for sale.
 #14 Park Department, Grand Rapids, Mich.

Now the balance of our time we will spend looking at slides. We have tried to stay close to the subject title of unusual plants, and I am deeply indebted to friends in various arboretums and botanical gardens - Morton Arboretum, Rochester Park, Bob Moore, and several other people for the loan of these very, very wonderful slides.

The first several pictures we have are evergreen collections in several arboretums. This one is the Morton Arboretum and shows the unusual forms planted among the ordinary species of pine.

This is Rochester Park. We show you these to invite you to visit the arboretums because they contain a lot of valuable plants. This area is a very beautiful place, the delta of an ancient river. This is the Pinetum in one of the valleys of Rochester Park.

This is Pinus aristata - the Bristle Cone Pine in the Rocky Mountains and some of you know this has now been determined to be the oldest plant in existence and predates the redwoods of California. Bristle Cone Pine - a very excellent picture.

Here is a close-up of the Bristle Cone Pine as it grows under cultivation. That is a picture by Bob Moore. Can you see the close-up of the branch in the slide? We have a peculiar waxy secretion from the foliage. It comes out and remains, and has been known as Mealy Bug. I have also been told and have known some folks to spray this with DDT to get rid of the Mealy Bugs. That is a waxy secretion and is a very unattractive thing.

This is Mexican white pine - Pinus Ayacahuite at Mexican Park, but unusual in Mexican white pine being hardy as far north as Rochester Park. It is a member of the White pine group.

This is a Weeping Jack Pine - Pinus banksiana. This pine was found just recently by Albert Johnson in the University of Minnesota at Richfield, Minnesota, which is a suburb of Minneapolis.

This again is familiar to a great many of you, but to many of you, it isn't. We will show you these peculiar forms - this is Pinus banksiana, a pine of China, a lace-like plant. It is from Morris Arboretum. The unusual part of Pinus banksiana, or lace-bark pine, is a mottled condition very similar to that of sycamore, a very beautiful and attractive thing.

This is a picture of Pinus cembra and Swiss Stone Pine. It is a slow growing, pyramidal shaped plant.

This is Pinus cembra columnaris Morris, a very, very old plant. I don't know exactly how old it is. A very narrow form of the Swiss Stone Pine. There is another form that is also narrow - Pinus cembra siberica, which is from the northern limits of the cembra, but we are unable to find it throughout the North.

This is Pinus densiflora oculus-draconis. The Pinus densiflora is Japanese red pine and that is one of the few colored foliage pines we have. This picture I believe is from the Morris Arboretum. It does grow with a trunk but Japanese red pine is one of the scrub pines of Japan with an irregular trunk. It maintains that same irregular shape. It has two bands of yellow foliage around the needle and the eye in the center, giving it that particular name, "dragon's eye".

This is the oldest plant we can find of the Pinus densiflora pendulum - the pendulum form of the Japanese red pine. This was put in here for our California members. It is in the Huntington Botanical Garden in California.

Here is the same pine on a standard, grafted up high and allowed to weep down. This work is done by a Holland nurseryman who is now living on the West Coast. I don't know how long he has lived there but he is able to graft on a standard outside in the spring of the year. (See paper by Spaan)

Pinus densiflora umbraculifera - the umbrella form of the small Japanese red pine. It grows quite well, not slow in growth. Here again is another one of these things on a standard also done by Spaan on the West Coast, making unusual effects.

The next picture will show a very large old plant. This plant I think is at Morton and is some 35 or 40 years old, and probably 15' high and of course, more than that in spread. It is Pinus densiflora umbraculifera.

Here is one found by Bob Moore. It is Pinus flexilis fastigiata. It covers a great part of the West Coast. This is one of the western white pine group. He found this old plant high in the mountains and growing in this form. It is the principal timber tree growing in the ordinary type method in the West. He found this one plant, and the next picture will show the first reproductions from that particular plant. Now whether this is going to remain fastigiata or not, we don't know, but these plants were produced from that first plant. These plants are from the D. Hill Nursery. They have some 20 odd plants.

The next picture is a mugo group at Morton Arboretum. It does not show, but mugo from seed varies tremendously, and we have one mugo at the arboretum which we delight in showing people. It is a mugo pine compacta, a very old plant, hardly three feet high and a great deal wider than it is high. A great many arboretums have dwarfs of Pinus mugo compacta.

This is not a very good picture, but this is Pinus mugo slavini which is at Rochester Park. The Slavins were prominent people in Rochester Park system. This is one they found 40 years or more ago. This was found in the fall and shows the shading of the needles and shows it very poorly but it shows the compact form at great age and remains in very excellent condition.

This is Pinus nigra globosa - the Austrian pine, if you wish, the globe form. This is a rather young plant. I think this plant is probably 10 or 12 years old, at the Morton Arboretum. I have another picture showing the development of numerous stems. This plant, I presume, is 35 years old, and it is hardly 10' high.

Here is another plant in Rochester Park - Pinus nigra hornbrookiana, named after that particular author, a plant found at Rochester Park and reproduced. This plant is 30 years old now. It is about 3' high, about 4' wide, and they tell me it is about 12' long. You can see it is found near a little stream or a ditch, so it has folded itself over very well in this particular area.

This is Japanese white pine - Pinus parvifolia. All of them do not have this peculiar, but very interesting form, with a flat top or layered branches. It is very picturesque and certainly looks Japanese.

This is a picture of Pinus pence. It looks similar to Pinus cembra. This, too, is at Morris Arboretum. It is the Macedonian pine coming from very much the same region and area as the Swiss Stone Pine. They both have very much the same shape - and both have five needles, but cembra has pubescence, a very noticeable pubescence on the new growth, and it is a characteristic you can always depend on, to sort them out.

This is a pine recently found by Albert Johnson at the University of Minnesota, an upright form of our native red pine - Pinus resinosa.

This is Pinus strobus densa, our eastern white pine, and densa is not recognized in the literature at all. This is something we bought at the nursery under the form densa. I believe it is something else, but at least we carry it under densa. You will see it is quite similar to others we have. The plant is a little more than five feet high but retained this form through all of these years.

Pinus strobus fastigiata. This is a younger plant. It does become wider of course, with age and I think the Arnold Arboretum people said at great age, it becomes quite wide. But for a long time it remains narrow.

This is Pinus strobus nana from the Arnold Arboretum and showing you a little bit of their Pinus collection. This is very old and dwarfed.

This is Pinus strobus Ontario. It is a seedling form that was found at Rochester Park in a block of seedling white pine of great age. They brought it out and planted it in the garden near the herbarium. It has a bluish cast and short needles.

Our next picture shows Pinus strobus pendula. This plant is at Morton Arboretum. The plant was obtained about 1935 or '36. This is just a recent picture and it weeps or droops very, very gracefully.

It makes a very interesting plant because it is most irregular. All branches come up and come down right to the ground.

Here is another dwarf form - Pinus strobus umbraculifera. This is again in the Arnold Arboretum, showing the beautiful arrangement in their Pinus, showing the dwarfed old plants of great age, well arranged.

This is the Pinus sylvestris fastigiata form of Scotch Pine. This is from the D. Hill nursery. I don't know if these are stock plants or not, but they show very well the narrow form. They are of considerable age.

This is another seedling form of Scotch pine found at Grand Rapids, Michigan in a forestry planting of Scotch pine. It is of great age and it is almost the approximate form of Scotch. It is Pinus sylvestris Grand Rapids.

The next picture will show you Pinus sylvestris nana. This is from Rochester Park and this is a plant of great age. It has maintained a central leader through the years but growing rather slowly and remaining dwarf.

This is Pinus sylvestris waterii, and that dates to about 1933 or so. It has a bluish cast to the foliage but grows in this particular form and habit, no leader at all, just a large round, very interestingly shaped plant.

This is Japanese black pine or Pinus thunbergii, interesting from a landscape point. You see these very, very crooked trunks. I know they have no sale as far as cash and carry. Everybody has to buy a tree with a straight trunk, but landscape people are extremely interested in this type of growth. I will show this next picture of a group of them. This looks like something in the nursery that the horse stepped on.

I only want to say in closing, whenever any of you have any unusual form, if you contact any arboretum we will be very, very happy to save them, because many of these things are found on occasion and they are immediately lost. The arboretums have provision to maintain woody collections and keep forever these very interesting forms that appear. I already have one who has approached me in the meeting so far and offered a different form of Pinus strobus. These things we appreciate very much. Thank you.

MODERATOR O'ROURKE: Thank you, Roy. I know we are appreciative not only of the wealth of material we have just seen but the fact that Roy Nordine has been able to collect pictures of all of those forms. I am sure it is something that is quite unusual and I know we are all deeply appreciative of the opportunity to see them.

There are probably quite a few questions and at the close of the period we will have a question and answer period, I hope, but now in order to move on - we are going to ask Mr. Vuyk to speak on "The