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Sidney Waxman

University of Connecticut - Storrs

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Fig. 1, *Pinus strobus* 'UConn'



Fig. 2, *Pinus strobus* 'Green Shadow'

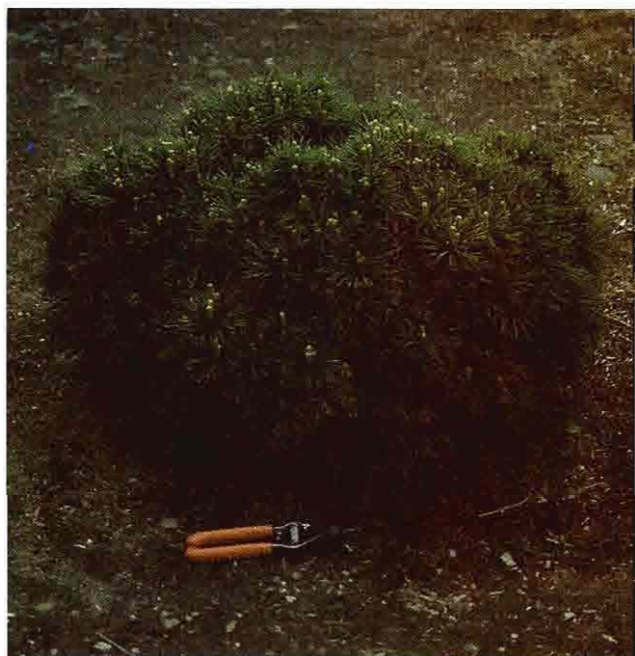
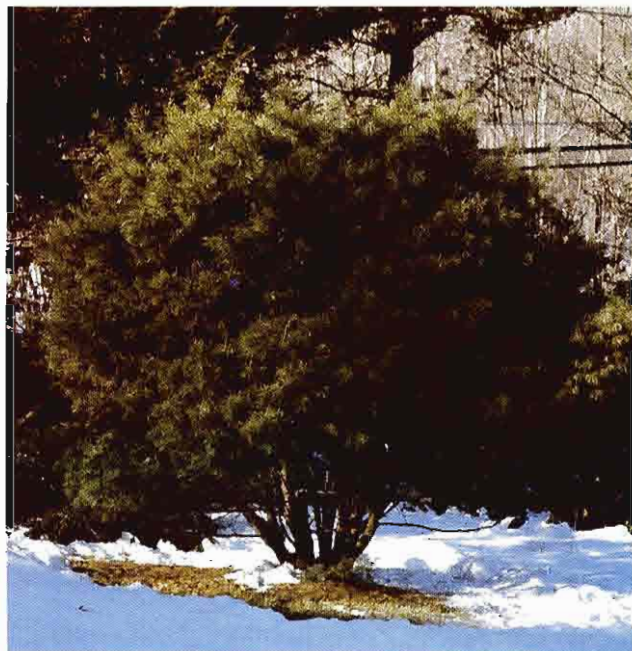


Fig. 3, *Pinus strobus* 'Sea Urchin'



Fig. 4, *Pinus strobus* 'Blue Shag'

STORRS AGRICULTURAL EXPERIMENT STATION
COLLEGE OF AGRICULTURE AND NATURAL RESOURCES,
THE UNIVERSITY OF CONNECTICUT, STORRS, CT 06268

Four White Pine Introductions From the University of Connecticut

By Sidney Waxman, Professor of Ornamental Horticulture, Plant Science Department

Witches'-brooms, those spectacular shrub-like growths which occasionally develop on various coniferous trees, are excellent sources of new forms of native evergreens (1,3,4,6). These dense abnormal growths originate from buds which have undergone mutation. As a consequence of these bud mutations, genetic changes become apparent with the development of growths that are easily discerned as being different from the remaining, "normal" parts of the tree. Usually the witches'-broom growth is densely branched, often having a mound like shape.

Observant horticulturists in years past, appreciating the aesthetic value of this type of growth, grafted portions of witches'-brooms onto normal seedlings and introduced them as dwarf evergreens (1,6).

Picea abies 'Maxwelli', a dwarf Norway spruce originated as a graft from a witches'-broom in 1874. *Picea abies* 'Tabulaeformis', another dwarf, was first grafted in 1890, while the dwarf Scot's Pine *Pinus sylvestris* 'Beauvronensis' originated as a graft from a

witches'-broom found in Beauvronne, France in 1891. More recently *Pinus nigra* 'Hornbrookiana' was grafted from a witches'-broom found on an Austrian Pine in Geneva Park at Rochester, New York by B.H. Slavin in 1932 (7).

Occasionally, some brooms have been found to develop seeds. When these seeds were collected and grown, half of them developed into unusual plants which exhibited various degrees of dwarfness (1,4).

There are now at the University of Connecticut Horticulture Research Farm several thousand seedlings of witches'-broom origin including such native species as White Pine, Scot's Pine, Pitch Pine, Red Pine, Norway Spruce, Canadian Hemlock and Eastern Larch. Among these are many very attractive forms that exhibit wide differences in needle color, needle length, rates of growth, and growth habit.

Selection of the clones, which are currently being named, were made by the author with the assistance of nurserymen, staff landscape architects, and horticulturists. At this time, selections were confined to *Pinus strobus* L., the Eastern White Pine:

I. PINUS STROBUS 'UConn'

Origin

This large pine was selected from among 202 seedlings collected from a witches'-broom in Hillsboro, New Hampshire in 1965. It had been grown in a greenhouse for one year and then transferred to a coldframe for two years. It was then lined out in the field and grown for nine years (Fig. 1).

Growth Rate and Vegetative Characteristics

The shrub has grown vigorously in this New England climate whose temperature extremes are -23°C (-10°F) to 35°C (95°F) during periods of both extremely wet and very dry soil conditions with neither protection nor irrigation during its nine years in the field. This selection has never been pruned nor has there been snow damage nor any damage caused by the White Pine Weevil.*

'UConn' is relatively fast-growing compared to other dwarf evergreens, and is currently producing approximately 38 cm. (15 in.) of stem growth annually. It has grown to a height of three meters (10 ft.), and has a diameter of 2.6 meters (8½ ft.). The needles are bright green and are approximately five cm. (2 in.) long.

There usually are six new shoots that arise from each terminal.

Its major characteristics are its broad pyramidal form and its relatively rapid rate of growth for a plant having such dense branching. The foliage is light green and the needles are retained for two years.

Functional and Aesthetic Aspects

This selection with its rounded pyramidal form and dense branching is suitable for:

1. Use in industrial plantings.
2. The development of a green background to highlight flowering trees or shrubs
3. Climate control
4. Windbreaks.
5. Privacy
6. Screening out noise or unpleasant views.
7. Plantings on highway median strips

Its main feature is that it is densely branched and has taken on this form without having been pruned or shaped in any way.

*This is not to imply that White Pine Weevil damage would not occur, but only to emphasize that the terminal shoots were not pruned in any way that might influence the branching habit of the plant

II. PINUS STROBUS 'Green Shadow'

Origin

This low spreading shrub was propagated by cuttings taken from a White Pine found in Torrington, Connecticut in 1969 (Fig. 2). It had been protected in a coldframe for one year, and then lined out in full sun where it had grown with neither protection nor irrigation for seven years.

Growth Rate and Vegetative Characteristics

Along with six other plants of this cultivar, this selection has grown vigorously under the same environmental and cultural conditions as previously described for *Pinus Strobus* 'UConn'.

'Green Shadow' is a dwarf multi-trunk tree with a

rounded top and dark green foliage. It has many trunks that arise from the base to make up its framework. It has grown to a height of three meters (10 ft.) in 20 years. Its form is broad when young and becomes more tree-like with age. The needles which are 7.5 cm. (3 in.) long, and thicker than the other cultivars, are retained on the plant for 3 years. An average of five shoots arise from each terminal.

Functional and Aesthetic Aspects

'Green Shadow', with its outstanding dark green foliage and dwarf habit, would be suitable for:

1. Foundation plantings.
2. Mass plantings.
3. Entrance gardens for light industry.
4. Specimen plantings.

III. PINUS STROBUS 'Sea Urchin'

Origin

This unique plant was selected from a population of 149 seedlings collected from a Waldoboro, New Hampshire witches'-broom in 1968. It was grown in a greenhouse and over-wintered in a cool pit house during its first year. It was then transferred to a coldframe where it remained for two years and was then planted in the nursery (Fig. 3).

Growth Rate and Vegetative Characteristics

'Sea Urchin' has an extremely slow rate of growth, 3.5 cm (less than 1½ in.) annually. It has been grown under conditions similar to those described for *Pinus*

strobus 'UConn'. The needles are small, three cm. (1¼ in.) long and are retained on the plant for two years. An average of four shoots arise from each terminal. At nine years of age this plant has developed into a low mound of dense blue-green foliage having a height of only 33 cm. (13 in.) and a width of 53 cm. (21 in.).

Functional and Aesthetic Aspects

This truly miniature plant is, of course, limited in its use in the landscape, but it would be highly desirable for:

1. Bonsai.
2. Rock gardens.
3. Planters.

IV. PINUS STROBUS 'Blue Shag'

Origin

'Blue Shag' was selected from a population of 741 seedlings originally collected in 1969 from a witches'-broom in Glen, New Hampshire. Its growing conditions were similar to those of the previous selections (Fig. 4).

Growth Rate and Vegetative Characteristics

Growth of 'Blue Shag' is mainly lateral, almost twice as broad as tall, and has very dense branches and long needles. Its current annual growth rate is approx-

imately 12.5 cm. (approximately 5 in.). The needles which persist for two years are bright blue-green and are six cm. (2½ in.) long. The overall dimensions of the plant, after eight years growth from seed, are 90 cm (3 ft.) tall and 165 cm (5½ ft.) wide. Its form is broad and irregular.

Functional and Aesthetic Aspects

This attractive selection would be suitable for:

1. Planters.
2. Entrance gardens for light industry.
3. Specimens.
4. Shrub borders.

PROPAGATION

Tests to determine the feasibility of rooting cuttings of these selections are currently being made. Earlier tests which were made of cuttings taken from a wide variety of White Pine witches'-broom seedlings showed high rooting percentages (60-90%) when the cuttings were taken from young, i.e., four-year-old plants. There was a general decrease in rooting of cuttings taken the following year when the plants were five years old. Significant differences in the ease of rooting between cuttings taken from juvenile and from mature plants have been reported for Eastern White Pine and other difficult to-root species (2).

In all cases, cuttings from "juvenile" growth root easier than cuttings taken from "mature" growth. This has proven to be the case with 'Green Shadow' in which cuttings taken from four-year-old plants had 60 percent rooting while similar cuttings taken from the original parent, when 19 years old, rooted only 4 percent (5).

The grafting of these selections presents no problem except that it is an expensive method of propagation. However, the extent of growth obtained from grafting, during the first four years, is considerably greater than that obtained on seedlings.

The sizes attained by these selections which had been grown from seed would have been reached three to four years sooner had they been grafted.

AVAILABILITY

Scions of these selected pines have been released to some Connecticut wholesale nurserymen who are cooperating with the University of Connecticut by evaluating the potential these plants may have for commercial production.

This limited distribution will be maintained until sufficient stocks become available for general release.

Along with the recent upsurge of interest in the environment and in horticulture in particular, there has been an increased demand for plants to enhance indoor and outdoor surroundings.

This has been especially prevalent in the cities where there is an urgent need to bring some vegetation into what otherwise has become a concrete forest.

City dwellers are able to beautify their interior surroundings with a wide variety of foliage plants that are available to them. To landscape their outdoor surroundings, however, they have a more restricted choice. Their needs are for aesthetically-pleasing, hardy species that do not quickly outgrow the space limitations set for them. Often, this problem is approached by the constant pruning and shearing of plants into rigid forms to keep them confined. This has proven to be effective, but often at the sacrifice of the plant's natural pattern of growth.

The witches'-broom seedling selections 'UConn', 'Green Shadow', 'Sea Urchin' and 'Blue Shag' are ideally suited for confined spaces because they grow slowly without the need for constant pruning and are aesthetically pleasing. Also, they are derived from native northeastern species and are, therefore, hardy and not "out of place".

In the future, more selections will be named from among the witches'-broom populations of White Pine (*Pinus strobus L.*), Red Pine (*Pinus resinosa*) and Canadian Hemlock (*Tsuga canadensis*).

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