

PROPAGATION OF WITCHES'-BROOMS

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Witches'-brooms consist of thick bunches of small twigs emerging from one point on a normal branch. They may continue growing for many years and apparently do no damage to the branch or the tree. They are called witches'-brooms because it was once believed that the trees and shrubs bearing them had been flown over by witches on their nocturnal flights.

These abnormal growths are caused by fungi, rust, Black Mildew, virus, mites, and other organisms. They have been reported from a large number of trees, shrubs, conifers, and herbaceous plants.

Dr. Henry Teuscher of the Montreal Botanic Garden reported to the International Dendrology Union in 1953 that some of these witches' brooms are caused by disease or insects, while others may be a bud sport. Teuscher reported that the witches'-brooms cannot be propagated by cuttings but must be grafted. He also reported that abnormal growths arising as a side shoot on a normal tree are the result of bud sporting and that they can be readily propagated from cuttings but may revert to normal growth.

In the magazine HORTICULTURE, July, 1960, page 372, is an article entitled "Witches Brooms" by Donald R. Yeager. The article lists the following dwarf plants that have been originally propagated from witches'-brooms:

- Picea abies tabulaeformis*
- Picea abies maxwelli*
- Pseudotsuga taxifolia astleyi*
- Pinus sylvestris beauvronensis*

Yeager reports that *Pinus nigra hornibrookiana* was grown from a witches'-broom found on an Austrian Pine about 40 years ago by B. H. Slavin. The first plant grown from this broom is now 30 years old and of irregular outline, being about four feet high, six feet wide, and twelve feet long. This plant is now in Durand Eastman Park, Rochester, N. Y.

In 1954 Bernard Harkness of Rochester Parks, N. Y., found an old and large witches'-broom on a branch of Amur Maple, *Acer ginnala*. This form was immediately propagated, but the grafted plants have grown more rapidly than the original mutation, although the globe shape is retained in the new plants.

In 1950 a witches'-broom was found on a Scots Pine in Riverside Cemetery, Rochester, N. Y. In 1954 Bernard Harkness grafted this form, which he named *Pinus sylvestris* "Riverside Gem". For the first few years the grafts made slow growth, but after five years, growth was very strong; the dwarf form was lost, and the grafts were destroyed. A new lot was grafted from the original witches'-broom, and they followed the same manner of growth as the first lot, and they have now been discarded.

Plant pathologists in studying the diseases that cause witches'-brooms have been successful in transmitting the disease to healthy stock through grafting. Those proved to be transmissible by grafting are usually virus-caused. This work is described in a German publication. (1) Transmission studies of alfalfa witches'-broom virus in Utah are described in AGRONOMY JOURNAL 52, pages 63-65, February, 1960 by Glover and McAllister.

We have tried grafting a number of witches'-brooms. The first one was from Black Walnut, *Juglans nigra*. In two attempts, one by grafting and later by budding, no scions grew. The second attempt was a broom from a Soft Maple, *Acer saccharinum*. Only a few grafts were made, on potted standards in the greenhouse, and most grafts were successful. For the first two years growth was very slow and the buds very close together. The third year the grafts returned to nearly normal growth for the species. The fourth spring they were moved to the Collections, where normal rapid growth was made. During mid-summer the various plants began dying; each plant would wilt and die within the space of two or three days. On examination, the stem and roots of the standard were found to be dead.

We have made two attempts to graft a witches'-broom of Concolor Fir, *Abies concolor*. In the first attempt of 20 grafts, only a few were successful, but all were dead by the end of the first summer. On the second attempt over 30 grafts were made. Nine are alive at the end of the second growing season; three died during this summer. Growth this year was short but averaged 3 or 4 times longer growth than on original branches. Buds on the new growth are very close together, as they are on the original broom.

We have also made grafts of *Acer ginnala* "Durand Dwarf", the witches'-broom from Durand Eastman Park, Rochester, N. Y. Only a few grafts were made in February, 1956, on potted understocks of *Acer ginnala*, and all grafts were successful. Growth the first two years was slow but in the third year it increased. In 1960 growth averaged 2-4"; this year, the sixth season of growth, terminal length increased to 6-9". One plant is now barely 3 feet high and 3-1/2 feet wide, but the plant has retained a fine globe shape.

In March, 1960, we made a few grafts from a broom on a Colorado Blue Spruce, *Picea pungens glauca*. Half are still alive, and growth this year has increased slightly over the growth on the original broom. Buds are very close together, but a little farther apart than on the original broom.

Most witches'-brooms contain a great amount of dead twigs, which is probably caused by the disease causing the broom to form. This disease is then transferred to the new grafts and is responsible for the continued mortality. Other brooms which are healthy, and where grafting results are satisfactory, may be bud sports.

- (1) HANDBUCH DER PFLANZENKRANKHEITEN, Band II, 1. Lieferung, Viruskrankheiten, by Kohler & Klinkowski; Paul Parey, Berlin & Hamburg, 1954.

MODERATOR MARCH: I am sure you would like me to thank all the speakers who have participated in today's program for their very fine papers.

PRESIDENT VAN HOF: For the assembly I want to thank Mr. March for conducting the meeting. We have stayed right on time. With a program like we have had, I thought we would have to forego our lunch.

The session recessed at 12:00 o'clock.

SATURDAY MORNING SESSION

December 9, 1961

The session convened at 9:30 o'clock, President Van Hof presiding.

PRESIDENT VAN HOF: Good morning, gentlemen.

Now, I see that our panel is anxious to get started and so without further ado it is a great pleasure to turn the meeting over to Roger Coggeshall.

MODERATOR COGGESHALL: This morning the meeting has to do with the Propagation Panel, and the first speaker on the panel will speak to us on the Propagation of Clematis - Mr. William E. Cunningham, Cunningham Gardens, Waldron, Indiana.

CLEMATIS

William E. Cunningham
Cunningham Gardens
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To give you an idea of the procedure we follow in producing clematis, first some comment should be made on the way in which the stock plants are managed. Soon after the first of the year, one-year old plants are brought out of refrigerated storage and potted in 4" and 5" pots in a soil mix which is high in humus content, a mix in which drainage is good and wherein there is adequate texture to permit a free exchange of oxygen. Our potting mix is made up of fertile field soil and peat moss at a 2 to 1 ratio, plus about 10% sand or perlite.

The dormant one-year old stock plants are potted over a period of several weeks to spread out the work load to alleviate the demand for growing space, and ease somewhat the demand for rooting space during the early spring season. We try to time the production of cuttings so that only about 20% of the total production occupies heated space in the early spring, with the greater proportion of the clematis production scheduled for the early and mid-summer propagation period.

The stock plants awaken from dormancy very rapidly, and they produce cuttings just a few weeks after potting - usually in 5 to 6 weeks.