How to Transform Standard-Sized Apple and Pear Trees into Semi-Dwarfs

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It is possible to transform standard-sized apple and pear trees into semi-dwarfs by bark inversion and by bridge grafting with dwarf rootstock scions.

I will refer to the bark inversion method as the "Dr. Sax method" because it was introduced by Dr. Karl Sax at the Arnold Arboretum, Jamaica Plain, Massachusetts. I will refer to the bridge grafting method as the "German method" because I used it as described in an article in the German magazine, "Deutscher Garten". Both of these methods can be exercised on pome fruits, but not on stone fruits, because the latter tend to bleed after wounding.

Sax Method

Dr. Sax's method consists of removing a ¾-inch ring of bark from near the base of the tree trunk and replacing it in an inverted position. The ring of bark should be removed carefully to prevent injury to the cambium. The inverted ring is bound tightly with a tape to obtain a good contact with the wood. I use electrician's tape. The non-sticky side of the tape should be placed against the bark to avoid damage to the epidermis when the tape is removed. Bark inversion must be done about the time of petal fall.

The nutrient sap from the roots is transported upward through the xylem (woody tissue) to the leaves which are the site of the organic nutrient production. The organic materials produced in the leaves are transported downward through the phloem (bark tissue) and distributed throughout the tree.

Because of the inverted ring of bark, the roots do not receive much organic nutrition and growth of the tree is restricted.

Most carbohydrates and other organic nutrients stay in the top of the tree and induce the formation of blossom buds and fruiting. Trees bear heavily and fruits are bigger. Also the tree is less susceptible to fire blight.

The tape should be removed in the late summer, but if it has not yet begun to cut into the tree, removal can be postponed until the following spring.

The dwarfing effect of bark inversion is not permanent because the cambium of inverted ring of bark formed normal bark tissue (phloem) for downward transport of organic nutrients. Therefore, bark inversion has to be repeated after 5 to 7 years. The first bark inversions on 7-year-old pear trees on pear seedling roots were made in 1956, the second in 1963 and the third in 1970 (Fig. 1). After the first bark inversion, the leader of the tree was cut back to approximately 10 feet in height.

At the age of 23 years these pear trees were about 12 to 14 feet high

Figure 1. Middle ring of bark inverted 1956. Bottom ring of bark inverted 1963. Upper ring of bark inverted 1970.

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Figure 2. Twenty-three-year old 'Clapp's Favorite' pear tree on seedling roots with 3 inverted rings of bark near the base. Tree height, 13 feet.

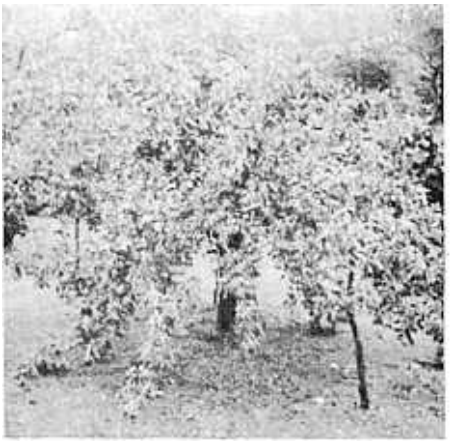

Figure 3. Twenty-three-year old 'Bosc' pear tree on pear seedling roots with 3 inverted rings of bark with full crop. Tree height, 12 feet.

(Figs. 2 and 3). They have had a heavy crop every year and no trees have been lost due to the bark inversion technique.

German Method

The German method of dwarfing consists of removing a 5-inch ring of bark from the base of the trunk and bridging it with dwarf rootstock scions such as 'M.9'. The dwarfing rootstock bridges which replace the removed bark produce the characteristics of the dwarfing rootstock scion and restrict the growth of the tree. After several years when the bridges have grown together, the tree takes on the appearance of a 'Clark Dwarf'.

The grafting procedure for the German method is as follows: Collect scions which are approximately ½ inch in diameter during the last part of March while the buds are still dormant, but after some sap is in the wood. Place the scions in a plastic bag and wrap the bag in a damp cloth. Store the scions in a cool place where they can be kept dormant until grafting time. Grafting should be done about the time of bloom when the bark slips readily. Remove the 5-inch ring of bark from the trunk base; make a sloping cut approximately 2 inches long at both ends of the scion; make a cut approximately 2½ inches long in the bark above and below the edges of the removed trunk bark; lift the bark and slip both ends of the scion underneath. It is important that the cambium under the lifted bark is not damaged and that the cambium layer of the scion is brought into close contact with the cambium layer of the tree.

Figure 4. Twenty-two-year-old 'Jonathan' tree on "Minnesota Seedling' roots bridge grafted in 1956 with 'M. 9' scions.

In this method, bridges should be spaced about 3 inches apart around the trunk making sure that the bark in the middle between the bridges does not lose contact with the wood.

Following grafting, the unions at which the scions have been grafted to the tree should be bound tightly with tape and sealed with grafting wax or asphalt grafting compound. In the summer all shoots from the scions must be removed. The tape with the sealing compound should be removed in the late summer. It is advisable to protect the bridge grafts from frost during the winter by wrapping them with Tree Wrap paper bands.

In 1956 I performed the German method on 7-year-old 'Jonathan' trees on 'Minnesota Seedling' roots with 'M.9' scions and in 1972 the trees were still only approximately 12 feet tall (Fig. 4).

The German method is more complicated than the Sax method but the dwarfing effect is permanent.

Fruit Breeding Projects at the South Haven Experiment Station

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In March of 1969 Professor Stanley Johnston passed away, leaving a rich legacy of fruit germplasm for the authors to utilize in continuing fruit breeding efforts by the Michigan Agricultural Experiment Station. Some changes in projects have occurred. This article briefly summarizes present projects and their objectives.

Dr. Andersen, Superintendent of the South Haven Experiment Station, makes the station his residence during the growing season. The rest of the year he is officed in the Department on the East Lansing campus where laboratory and computer facilities are available. He is responsible for all tree fruit breeding.

Dr. Moulton is responsible for the small fruit breeding projects and has his office and home in East Lansing.

Fruit Breeding Projects

Apricots. This project started in 1939. One variety, 'Goldcot' (1967) was developed by breeding, and several other breeding selections are now receiving extensive orchard trials in Michigan. These have not been officially named or released. There is considerable interest in the possibility of growing apricots in carefully selected locations in Michigan both for fresh market and for processing.

Blueberries. The South Haven Experiment Station started investigations with the highbush blueberry in 1923. From this beginning a large industry has developed in Michigan. In the early stages, blueberry research at South Haven was largely involved with cultural problems. Blueberry breeding has followed two avenues, 1) crossing with the highbush species and 2) crossing the lowbush and highbush species. The main objective of the latter type of hybridization has been the development of suitable varieties for northern Michigan and for regions of simliar climate. There, the growing season is too short and temperatures too low for success with the highbush varieties. This has been a time-consuming and difficult project, but encouraging results have been obtained in recent years. The 'Northland' (1967) variety shows best suitability for this use. A wide range of interesting plant material has been obtained in this project, some of which

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