

Propagating Difficult-to-root Roses from Root Pieces

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INTRODUCTION

At the Corn Hill Nursery we have been producing roses from softwood cuttings since 1982. Because of our extreme winter conditions, we grow only the very hardiest types. We have also concentrated on producing those roses that possess good resistance to fungal diseases such as blackspot and mildew. We grow many of the older garden roses including *Rosa* × *alba*, *R. gallica*, and *R. spinosissima* (syn. *R. pimpinellifolia*) taxa. However, the bulk of our inventory consists of *R. rugosa* hybrids and modern shrubs, particularly the roses developed by Agriculture Canada called the Explorer Series, which have used genes from *R. kordesii*, among others.

We take our softwood cuttings as soon as flower bud formation commences in early summer. Cuttings for the day are collected in early morning and stuck in a perlite and peat rooting medium (4 : 1, v/v), usually with a Seradix #2 IBA treatment. Cuttings are then placed in houses that are humidified with a high-pressure fog system. The majority of roses root well using this system, although success rates can vary from 20% to 100% depending upon cultivar, with the average take being approximately 80%.

There are some roses, however, that have defied our attempts to root them. The worst offenders are those having *Rosa foetida* 'Persian Yellow' in their genetic background. These include roses such as 'Harison's Yellow', 'Agnes', and 'Aïcha'. We have tried innumerable formulations of rooting hormones and have adjusted our timing and rooting mediums to see if we could raise our percentages to economically justifiable levels. Results have been discouraging at best. Our best crop of 'Agnes' produced a success rate of approximately 10%. Those that do root usually produce one or two small weak roots that are easily broken when potted or set out in the field.

A few years ago it occurred to me that we may have been overlooking an obvious avenue of exploration. Roses such as 'Agnes' and 'Harison's Yellow', as do many roses, sucker profusely when on their own roots. It seemed reasonable that these plants might be grown from root pieces as we do with such plants as sumac and poplar.

MATERIALS AND METHODS

The biggest stumbling block to this procedure has been the lack of own-rooted stock plants. We have begun to solve this by planting out every cutting that we were able to produce into stockblocks. At present we have stock blocks comprised of approximately 100 'Agnes' and 50 'Harison's Yellow'. We have also set out budded plants with the bud union buried deeply to encourage the cultivar to produce roots of their own. While our stock blocks are still young we have been able to produce enough suckers on older plants in our display gardens to test our theories.

We gather our root pieces in late October and early November just prior to freeze. We have developed shoots on roots collected in spring as well but find that our percentages are higher using fall gathered material. One of the first things we

learned was that pieces taken from the horizontally growing suckers will shoot much more readily than from root pieces taken from the main root system. This seems obvious, as the suckers are a long series of adventitious buds. Pieces taken from the main root system will, however, root and if we have these available we will use these as well.

We cut the roots into pieces approximately 5 cm (2 inches) in length. We use only root pieces having a minimum diameter of 5 mm ($\frac{1}{4}$ to $\frac{5}{16}$ inches). Pieces smaller than this rarely produce shoots before rotting. We bundle these in bunches of 25 and set them horizontally in baskets of clean sawdust. These are placed in the cold storage unit at 0 to 1C (32 to 34F). Initially we soaked the root pieces in hydrogen peroxide to destroy any fungi or bacteria. We have since tried storage without this treatment and have not found any difference in storability. If kept at temperatures of 0 to 1C (32 to 34F) we have experienced no storage problems. In the future we may attempt placing the root pieces directly into the flats in which they will develop the shoots.

At present we bring the root pieces out in late March and lay them horizontally in flats. Our flats are 3 inches deep. We fill them to a depth of 2 inches using the same perlite and peat (4 : 1, v/v) rooting medium we use for our softwood cuttings. Small quantities of a slow-release fertilizer are incorporated into the rooting medium as well to encourage growth as soon as the roots have shooted. The root pieces are then covered with another 1 inch of medium, placed on heated beds set at 25C, and kept moist but not wet. The first shoots generally appear within 14 days and by 28 days all the roots have usually shooted. Because these shoots are not propagated in mist or fog, as are softwood cuttings, there is very little time needed for hardening off. Once the root pieces have formed new feeder roots they can be planted into field beds or into containers.

RESULTS

The most important thing we have learned from our trials is that the method works and we are very encouraged by our results. We have successfully produced shoots from a large number of cultivars with varying genetic backgrounds. Generally those taxa that produce suckers readily are the best adapted to this form of propagation. It is our belief that virtually any rose that produces suckers can be propagated from root pieces.

Most of our trials have involved 'Agnes' and 'Harison's Yellow' as these have been the most difficult-to-root roses. Our percentage of success with 'Agnes' has been averaging nearly 90%. Our percentage of success with 'Harison's Yellow' is not quite as high but has averaged near 70%.

DISCUSSION

While we realize that this method is not as economically attractive as budding, it gives us the ability to grow own-rooted plants of rose taxa which are not efficiently raised in a conventional softwood cutting program.

The greatest initial drawback to this system is the time required to develop mature blocks of roses that will provide a crop of suckers. However, once we can develop our program to the point at which we are harvesting sizable crops of these roses, we will be able to harvest roots from our production plants at fall harvest to augment the production from our stockblocks.

We also intend to explore how shoots from the root pieces will root, as it has been our experience with genus *Malus* that rootability can be substantially enhanced by working with shoots from root pieces because these shoots are in a juvenile condition and do not have the physical barriers to root formation present in adult phase material.

Propagation of *Phlox paniculata* From Root Cuttings

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***Phlox paniculata* cultivars can be propagated by division and top and root cuttings. There is, however, a reason to use root cuttings over the other two methods and that is leaf nematodes and fungal diseases are propagated with the propagule while root cuttings are generally free of these pests.**

PROCEDURES

Currently Used Root Cutting Propagation Methods. Before starting I will discuss the different methods that are being used to produce plants from roots. The oldest is simply to dig plants close to the stems, leave most of the roots in the ground, fill in the holes, and then remove the plant sprouts from the ground when they can be handled. Proper labeling and space between cultivars is important to prevent mixing. Depending on the size of the mother plant, this method can yield quite a number of plants for little expense.

The next method requires a heated greenhouse where temperatures can be maintained at 18 to 22C. Dormant 2-year-old plants are fall dug, retaining all roots, and cold stored until February. Then 1- to 2-mm root pieces 3 to 4 cm in length are planted with their proximal end up at a space of two roots per centimeter into rows 10 to 15 rows per standard flats. Depth of cover is 1 cm. David Beattie (Penn State University, University Park, Pennsylvania) describes a method where root cuttings are bundled and placed into 48- or 72-pocket trays without medium and placed into a grafting case at 68F. Sprouted cuttings are taken out and planted individually.

Another method is to spread the root pieces onto medium and cover with no more than 1 cm of propagation medium; it is best not to disturb the sprouts until at least the second or third leaf stage. The new shoots are very brittle and removing plants disturbs the remaining roots. While waiting for all the roots to develop shoots, the quick sprouting root pieces can be pruned to keep them uniform before transplanting.

With the advent of container growing we see roots becoming smaller and instead of growing down into the ground, circle the container — which end is up? I tried cutting the roots vertically and horizontally, but found that there were no differences in shoot production.

Research Results. I conducted some timing trials on the best time to harvest root pieces. I divided a group of container-grown phlox into three samples. The first group of dormant plants in 15-cm container were brought into the greenhouse, roots were cut into 4-cm slices, placed into a standard flat, and covered with medium. Yield was