

ing repotted initiating some form of stress that was not immediately detectable and the other could be that late July is truly too late for adequate success which again points to taking the cuttings at an earlier date. Expanded photoperiod may have well helped in allowing the cuttings a longer period of recovery prior to winter and could well have increased the rooting potential overall.

More work needs to be done to perfect the technique but it is evident that this obscure relative of the elms could be successfully reproduced via cuttings with several improvements with respect to timing.

#### LITERATURE CITED

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## Propagation of *Clematis fremontii* and Related Species from Seed<sup>®</sup>

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#### INTRODUCTION

*Clematis fremontii* Wats is a nonvining species of *Clematis* found in the high plains of Kansas, Nebraska, and Colorado. It makes a very stout perennial that although diminutive approaches a shrub in form and texture. Being from the west central part of the United States it is naturally accustomed to long period of drought and heat during late spring into fall. As with all clematis and other members of the Ranunculaceae the entire plant is poisonous and is rarely a victim of herbivores. This can make the plant the bane of many high plains cattle ranchers as the cattle will either eat the plant and become deathly ill or eat everything else but it so that in the wild there is little or no competition to impede its distribution, particularly in cow pastures. It does have a good side however in that it provides a multitude of blue to purple blue-bell-shaped flowers that hang down and are considered to be quite handsome. The flowers with respect to most other shrubby type clematis are quite large and showy.

#### SEED PROPAGATION

Seed of this species can be collected in late summer when it is turning from green to a dull brown. The individual seeds like all clematis have a long pronounced tail and are usually quite pubescent. For a clematis, *C. fremontii* has quite large seed, which is easy to handle.

The seed can be rubbed on a hardware cloth screen to break off the ever present tail but this is not a fundamental requirement, although, tailless seed is a lot easier to handle. The key factor to germinate *C. fremontii* and others such as *C. forsteri* (syn. *C. hexapetala*), *C. pitcheri*, *C. × diversifolia* (syn. *C. eriostemon*), *C. heracleifolia*, and *C. stans* is to provide a long period of warm moist stratification. This can best be accomplished by stratifying the seed in moist perlite. The perlite is prepared by filling a bucket with holes in the bottom with perlite and pouring a large quantity of water into the bucket so that the water drains straight through. This wet perlite is then set aside and allowed to drain completely for 24 h before using.

A long period of warm moist stratification means just that. Stratification periods of up to 6 months or even longer seem necessary to get clematis seed to cooperate. The moist perlite is put into heavy-duty freezer type zip-lock bags. A given quantity of perlite is placed in the bag with an ideal ratio of perlite to seed of 20 : 1 (v/v). There should be substantially more perlite than seed. Then the seed is placed in the bag and more perlite added. If the seed is exceptionally dry then the ideal approach is to place a completed bag into another larger bag of moist perlite so that the stratification bag is now enclosed in a second moisture laden bag. This keeps the inner bag moist as sometimes especially with large quantities of seed and a dry environment the perlite in the stratification bag can become quite dry. The completed bag is then left in the dark in a warm dry place. Under a kitchen cabinet, file drawer, basement or similar is adequate. Care should be taken not to allow the bag to be close to an exceptional heat source or direct sunlight as too much heat can be a problem.

The bag should be inspected monthly for signs of a radicle formation. If radicles do form and are of sufficient quantity then the bag can be removed and placed in cold stratification at 35 °F for about 6 to 8 weeks. Caution, if the 6 to 8 weeks is going to place the now completely stratified seed in a situation where a warm greenhouse is not available or spring is not at hand the best approach is to let the warm stratified seed remain in a warm environment and not place it in the cold until the timing can be met so that normal germination can then take place. Warm stratified seed with a radical will do nothing without a cold treatment but a seed with a set radicle once subjected to the cold cycle cannot be stopped and will either die or germinate in the bag if kept too long. This can be a very costly and difficult situation to deal with if adequate greenhouse space is not available.

After the cold stratification period the seed might or might not be showing new shoots but should be sown as soon as possible. Particular germination mixes are varied and are not specifically important other than all should be as free draining as possible. *Clematis fremontii* especially is most sensitive to overly wet or poorly drained media. Seed should be sown in individual cells or pots to avoid transplanting shock. Initially the seedlings will be small and with just a few leaves. They may remain that way for most of a year with the bulk of the activity being beneath the soil surface with the formation of copious amounts of roots. The following spring the seedlings should spring to life with a vengeance once their vernalization period has been met. Usually 6 to 8 weeks of normal cold winter temperatures are sufficient to accomplish this. Fertilization starting in the early spring is most beneficial and with the large root mass the seedlings should progress quite well throughout the year.