temperatures or bottom heat is helpful. Mist may or may not be a requirement depending upon the time of year. Cuttings of *O. armatus* did not have a lot of leaf drop during the winter months, although cuttings of *O. heterophyllus* has a significant leaf drop, often denuding the cutting completely and rendering it unsuitable from that point on under similar circumstances. *Osmanthus armatus* cuttings are not fussy once rooted and if transplanted early will resume growth before fall.

SIGNIFICANCE TO THE NURSERY INDUSTRY

Osmanthus armatus is an attractive shrub and has good cold hardiness possibilities. Flowering, while insignificant, is quite fragrant, and the shrub does have merits for fragrance in the garden. In many instances it could be planted in the same situations as many hollies.

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Mespilus canescens a Newly Discovered Species: Propagation by Grafting onto *Crataegus*©

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INTRODUCTION

Mespilus canescens (Sterns medlar) was discovered in 1990 in the 22-acre Konecny Grove Natural Area in Arkansas (Center for Plant Conservation, 2005). Phipps (1991) documented *M. canescens* to be an additional new species to the heretofore-single genus and species, *M. germanica*, a European plant.

Further work by Phipps et al. (1991) demonstrated that isozyme analysis positively grouped the new plant as a *Mespilus* species. However, Dickinson et al. (2000) suggests that due to the close relationship of *M. canescens* to *Crataegus* there is some DNA evidence to suggest that it might be of hybrid origin. Further evidence of the kinship to *Crataegus* is given credence by noting that both *M. canescens* and a number of *Crataegus* have 20 stamens. Dickinson (2000) also mentions that *M. canescens* is almost indistinguishable from many *Crataegus* species, although it does lack thorns. Further evidence supporting the kinship of *Crataegus* to *Mespilus* is offered by Griffiths (1994) who lists ×*Crataemespilus gilliotii* and ×*Crataemespilus grandiflora*; two hybrids *Crataegus monogyna* × *Mespilus germanica* and *Crataegus laevigata* × *Mespilus germanica*, respectively. Since *M. canescens* does not seem to reproduce in the natural state researchers from the Missouri Botanic Gardens (Center for Plant Conservation, 2005) have tried and succeeded in rooting cuttings and attempted tissue culture as well. (Author's note: the fact that cuttings root

tends to push this plant away from being a *Crataegus* since few if any *Crataegus* will root from cuttings.) Further propagation is needed to ensure the survival of the species because it is specifically limited in the wild to 25 individuals (Center for Plant Conservation, 2005).

Tubesing (1988) mentioned the grafting of *M. germanica* onto *Pyrus ussuriensis* as something that works but is limited due to delayed graft incompatibility. Del Tredici (1995) mentioned in a review article a passing reference to *M. germanica* being propagated from root cuttings, but due to the unique situation of *M. canescens* this approach did not seem practical or available. Grafting was chosen as a possible propagation technique based on the time of year that rootstocks of *Crataegus* are generally quite available and the kinship of *Mespilus* to *Crataegus* has been well established.

MATERIALS AND METHODS.

One sizeable plant of *M. canescens* is at the Mountain Crops Research Station of the North Carolina State University in Fletcher, North Carolina. Dr. Tom Ranney graciously supplied a small amount of scion wood for propagation experimentation at Lorax Farms. Scions were received in late February and in anticipation of their arrival several seedling *C. maximowiczii* were put into a warm greenhouse (10 °C) and forced into active root growth. A typical side graft was used and tied with a rubber budding strip then sealed with Parafilm™ M (Modern Biology, Inc.). Only two grafts were made, and they were done on the same rootstock species. The completed grafts were tented with large, 4-L, Zip Loc bags. Bags were sealed so that moisture was retained around the grafts provided by a damp paper towel at the base of the bag and the grafts were placed in such a way as to avoid direct sunlight. Approximately 6 weeks after grafting and temperatures and light levels were on a steady increase, buds of the *M. canescens* started to break; at this juncture the sealed bag was slowly vented to allow in fresh air. Slowly over a period of 1 week the bag was vented further and further so that the soft new growth could acclimate to the normal greenhouse air conditions and humidity. Bottom heat by the end of the 6-week period had gradually been raised to 20 °C.

The *Mespilus* grafts were potted on and allowed to grow for another 2 months when the rubber grafting strips and Parafilm™ were removed and replaced with blue painters' masking tape. The tape was put on in such a way as to prevent accidental damage to the new graft union. There was a 100% success. After 2 years the grafted plants are still growing with no suckering from the *Crataegus* rootstock.

From this limited work it is suggested that *C. maximowiczii* works well as a rootstock for *M. canescens* and that bulking up of the few available plants could well be accomplished by this technique.

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Somatic Embryo Development in Willow Oak©

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INTRODUCTION

Willow oak (*Quercus phellos*) is an important landscape plant and forestry tree generally propagated by seed for commercial production. Recent propagation of willow oak has been through cuttings taken from juvenile stock plants; however this does not allow for selection of mature characteristics such as autumn color, tree shape, winter hardiness, or ease of production. Somatic embryogenesis would allow for the mature mother plant to be rejuvenated into a juvenile form for cutting propagation while still having the clonal characteristics desired (Geneve et al., 2003).

Somatic embryogenesis has been reported in a number of oak species, with the majority of the work being performed in English (*Q. robur*) and cork oak (*Q. suber*). In these species, the frequency of somatic embryo induction is between 80% and 100% from immature zygotic embryo explants but less than 15% using seedling leaf tissue (Wilhelm, 2000). However, regardless of the initial source, somatic embryo maturation, conversion, and germination have been difficult. Often the somatic embryo forms shoots or roots only, and complete recovery of plants is at a low frequency (Wilhelm, 2000).

Typical treatments used to enhance normal somatic embryo formation and encourage conversion include abscisic acid (ABA) and altering the osmotic potential of the medium using sucrose, mannitol, and sorbitol. Treatments used to stimulate germination in oaks are cytokinins and gibberellic acid (Wilhelm, 2000). The objective of this research was to investigate the effects of ABA, cytokinin, gibberellic acid, and sucrose concentration on development of somatic embryos derived from immature cotyledons of willow oak.

MATERIALS AND METHODS

Acorns were collected in August and surface-sterilized in 10% bleach for 15 min, followed by a dip in 70% ethanol and rinsed three times with sterile water. Cotyledon halves from the zygotic embryo were placed on MS (Murashige and Skoog, 1962) basal media in Petri plates containing 1 μM benzyladenine (BA) and 0, 1, 5, or 10 μM naphthaleneacetic acid (NAA). These plates were then placed under cool white fluorescent lights (16-h lighted photoperiod, PAR 60 $\mu mol \cdot sec^{-1} \cdot m^{-2}$) at 21 °C. Explants were transferred to MS medium containing no growth regulators every 3 weeks until somatic embryos formed.