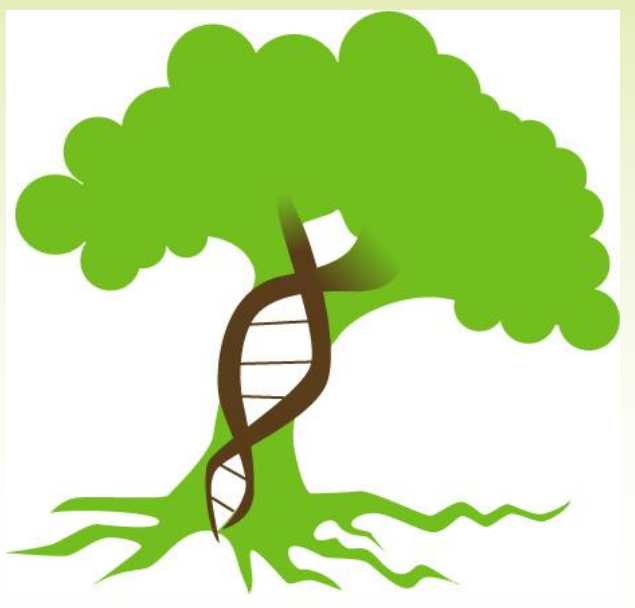


# Comparing Four Nursery Production Methods on Chestnut Hybrid Seedling Quality

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## METHODOLOGY

### INTRODUCTION

- American chestnut (*Castanea dentata*) was a keystone species in the Appalachian region until its removal by chestnut blight (*Cryphonectria parasitica*) in the early 20th century
- Backcrossing Chinese chestnut (*Castanea mollissima*) with American chestnut has produced a tree that resembles the American phenotype in order to re-establish the tree in its native range and ecological niche
- Current restoration efforts focus on three techniques: direct seeding, bare-root seedlings, and container grown seedlings
- Propagation methods and their effect on seedling quality are species specific; there is a research gap on propagation methods and American chestnut
- Air-pruning roots can produce a more fibrous root system with higher first order lateral roots (FOLR) and root collar diameter – qualities linked with increased field performance
- Research on other *Fagacea* suggest that propagation method can have significant effects on seedling morphology, seedling quality and establishment in field after planting



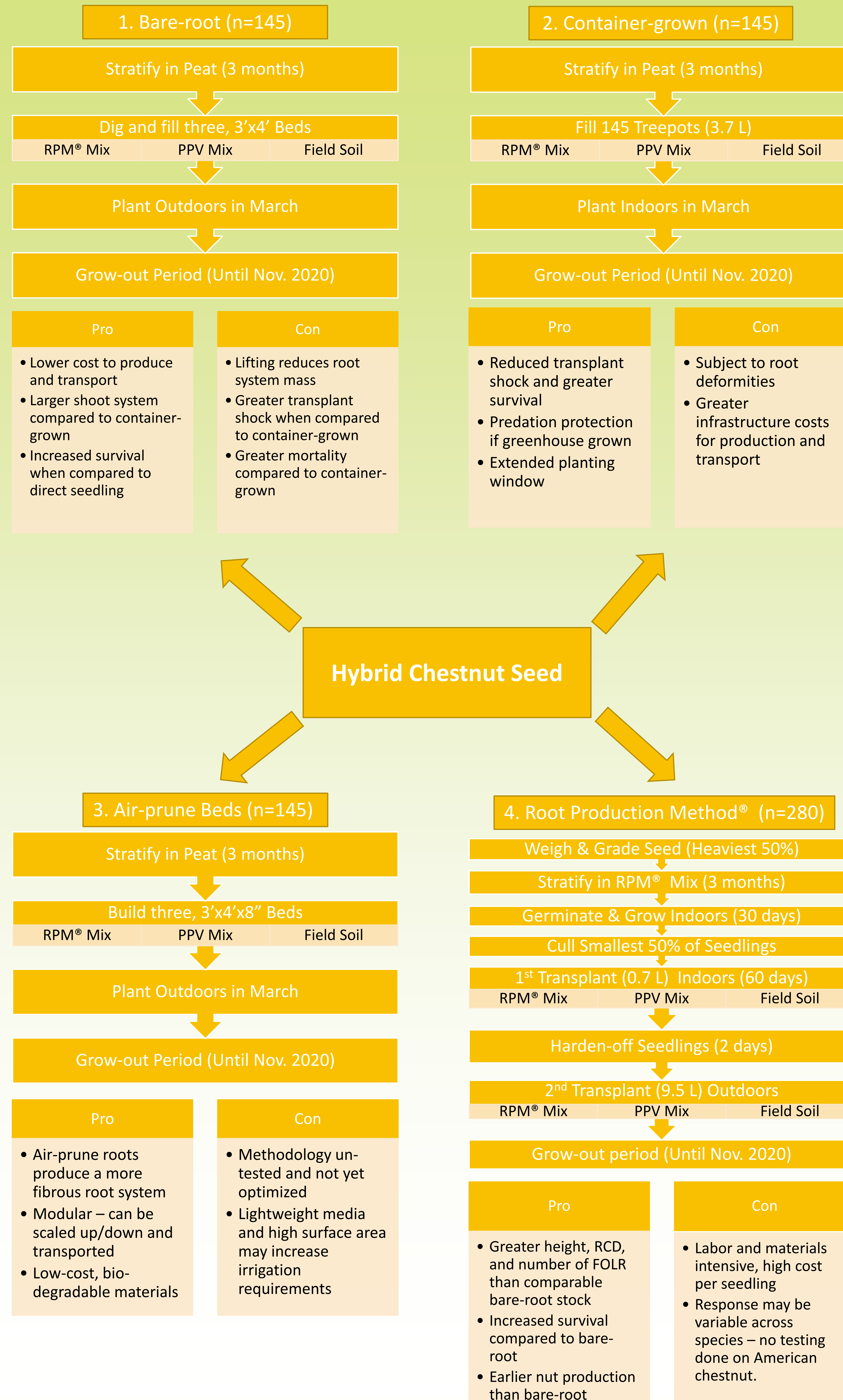
Photo 1: Comparison of 210-day root growth of bare-root (left) and RPM seedling (right).  
Source: Forrest Keeling Nursery.

### GOALS

- Fill a gap in research on chestnut seedling propagation by comparing the effect of methodology on seedling morphology and overall seedling quality
- Test two novel propagation techniques against industry standards to determine their effects on seedling morphology and overall quality
- Provide growers with information on least cost approaches to produce seedlings with beneficial morphological characteristics
- Provide seedlings for long-term survival and growth testing based on nursery technique

### How does nursery propagation method influence seedling quality and seedling cost?

Treatments (12) = Propagation Method (4) \* Media Type (3)



### DATA COLLECTION AND ANALYSIS

- After one growing season, seedlings will be removed from their growing treatment and measured for:
  - Height (root collar to terminal bud)
  - Root-collar diameter
  - Root volume
  - Number of first order lateral roots (FOLR) greater than 1mm.
- Overhead materials cost and labor hours will be used to determine cost per seedling
- An ANOVA analysis and appropriate post-hoc tests will be performed for each measurement to test for significance.



Photo 2: Example of an air-prune bed filled with lightweight media. Source: Twisted Tree Farm

### PREDICTIONS

- Air-prune and RPM® seedlings will show greater height, root collar diameter, FOLR count, and root volume than bare-root or container grown seedlings
- Container seedlings will show greater root collar diameter, FOLR, and root volume than bare-root seedlings
- There will be no difference between air-prune and RPM® seedlings in any morphological characteristic
- We expect RPM® to show the highest cost per seedling and bare-root the lowest cost per seedling.

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