

TREE GROWTH, VINE GROWTH, AND RESOURCE USE IN AN AMERICAN CHESTNUT-HYBRID WINE GRAPE AGROFORESTRY SYSTEM

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Introduction

Agroforestry systems integrating trees with field crops, pasture, and livestock are receiving increased interest for their sustainability potential. Traditional and modern knowledge are used to optimize resource use and beneficial crop interactions. Here, a traditional European system combining chestnut or other trees, wine grapes, and field crops, is explored in Upstate New York.

A Comparison of 3 Systems

RESEARCH OBJECTIVES

- Compare American chestnut and hybrid wine grape growth between agroforestry and conventional systems, and within agroforestry.
- Compare resource investment in establishment of agroforestry and conventional systems.

METHODS

- American chestnut and 2 hybrid wine grape varieties were planted in replicas of a conventional orchard, vineyard trellises, and in the agroforestry system at densities of 1, 3, and 5 vines per chestnut.
- Chestnut and grape height and diameter growth were compared at biweekly, monthly, and full season intervals.
- Research in progress compares resource investment between systems using eMergy analysis.

Results

BETWEEN SYSTEMS:

- Overall, American chestnut in agroforestry plots grew significantly larger in height and diameter at monthly and full season intervals, and in diameter at biweekly intervals, than in the conventional orchard.
- Height and diameter growth in both varieties of hybrid wine grape did not differ significantly between systems

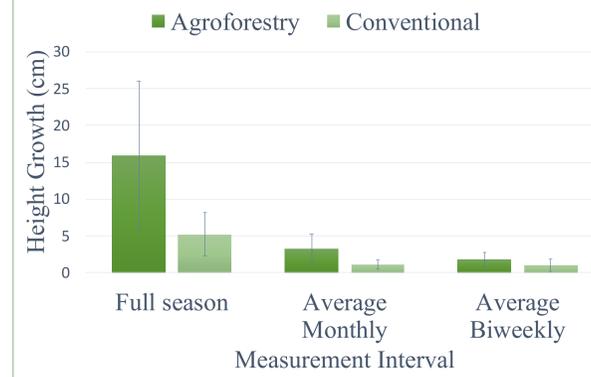


All Photos: Elizabeth Kehas-Dewaghe

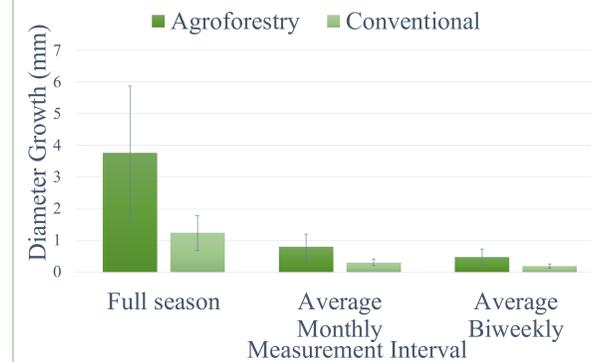
WITHIN AGROFORESTRY:

- American chestnut grew significantly larger in diameter at grape densities of 1 vine than 3 or 5 vines at full season intervals, and significantly larger at 1 vine than 5 vines, with no significant difference between 3 vines and either 1 or 5 vines at monthly intervals.
- Chestnut height growth did not differ significantly with grape density.
- Height and diameter growth in both hybrid wine grape varieties was significantly influenced by interaction between vine density and variety.

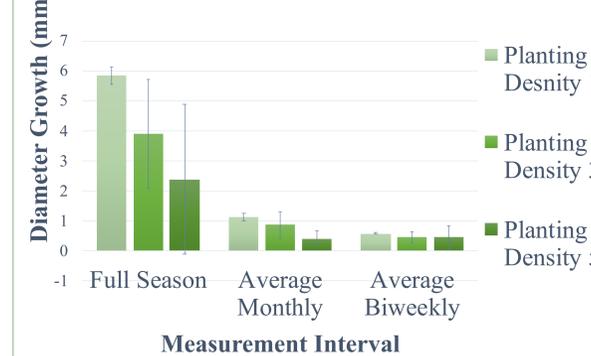
2021 Chestnut Height Growth by System



2021 Chestnut Diameter Growth by System



2021 Chestnut Diameter Growth by Planting Density



Conclusions

- Co-planting American chestnut in the agroforestry system with hybrid wine grapes exerts a positive effect on early chestnut height and diameter growth while exerting no negative effect on wine grape growth.
- Within agroforestry plots, the positive effects of co-planting on American chestnut were most pronounced at lower planting densities of 1 to 3 vines per seedling.
- Variation in wine grape growth resulting from the interaction between planting density and variety within agroforestry plots indicates more research may be beneficial in identifying grape varieties exhibiting best growth performance in this system.

