

## Propagation of Chautauqua Oaks at Niagara College

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### INTRODUCTION

The Chautauqua Oak Propagation Research Project aims to evaluate nursery propagation containers and production practices for growing oak trees with healthy root systems. During the propagation phase of growth in the Niagara College Greenhouse, RootSmart™ propagation trays were evaluated in combination with fertilizer and watering strategies to optimize white oak seedling root growth and survival.

### MATERIALS AND METHODS

White oak (*Quercus alba*) were collected by Niagara College students from oak trees in the Chautauqua community in September 2018. Acorns were kept moist and planted shortly after collection into Ellepot-filled RootSmart™ trays in the Niagara College Greenhouse and grown on the propagation bench. To all plants in each tray, one fertilizer rate and one watering method was applied, totaling 6 treatment combinations as follows: Fertilizer 1 (F1): Osmocote Bloom 12–7–18,

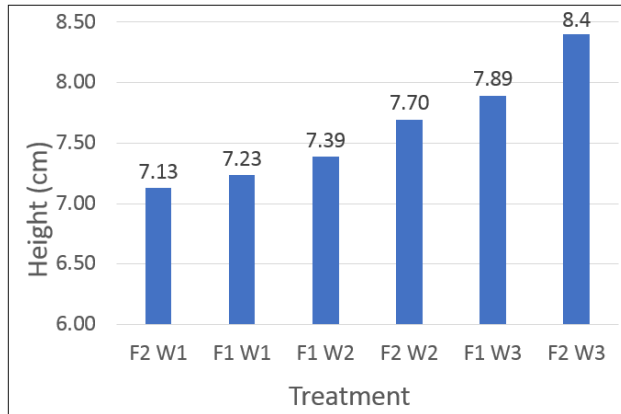
5–6 month, 2 g·L<sup>-1</sup>; Fertilizer 2 (F2): Osmocote Bloom 12–7–18, 5–6 month, 4 g·L<sup>-1</sup>; Water 1 (W1): Overhead mist watering, 30 sec every 2 h.; Water 2 (W2): Water applied by hand, ½ capacity of an Ellepot; Water 3 (W3): Water applied by hand, full capacity of an Ellepot.

Plant height was measured at the completion of the propagation phase of growth (17 Jan 2019) and five representative plants per treatment had the growing media washed from the roots to evaluate root dry weight and architecture. Plant survival (n=50) was evaluated after a 3-month (January — April, 2019) (5 °C) cold period in a climate-controlled chamber.

### RESULTS AND DISCUSSION

After the propagation phase of growth, on 17 January 2019, white oak seedling shoot height showed differences among treatments. The average height of F2 W3 was the tallest, followed by F1 W3 and F2 W2 (Fig. 1). Plant

height responded primarily to watering treatments, followed by fertilizer rate. Seedlings preferred full capacity watering



**Figure 1.** Shoot height among fertilizer and watering method treatments, evaluated on 17 January 2019.

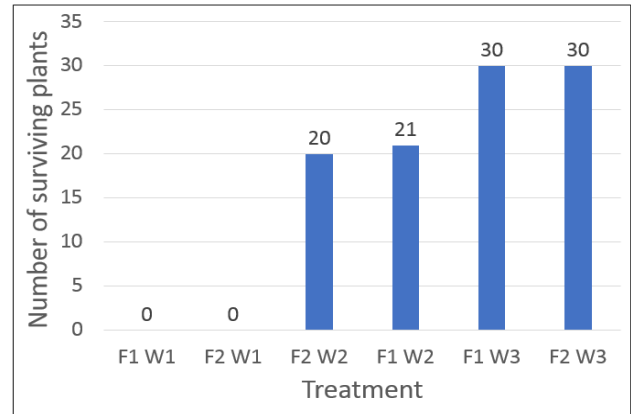
Survival rate of seedlings clearly showed the impact of watering method during propagation (Fig. 2). Seedlings in the W3 watering method had 60% survival, while lower survival (40%–42%) occurred for seedlings in the W2 watering method. Overhead mist watering (W1) was insufficient to ensure survival of any white oak seedlings, evaluated after the 3-month cold period. Fertilizer rate did not impact survival of white oak seedlings.

Fertilizer rates had minimal impact on root dry weight; therefore, plants were combined per watering method for evaluation. Root dry weight of seedlings in both watering method W3 (0.928 g) and W2 (0.849 g) were significantly greater than W1 (0.627 g).

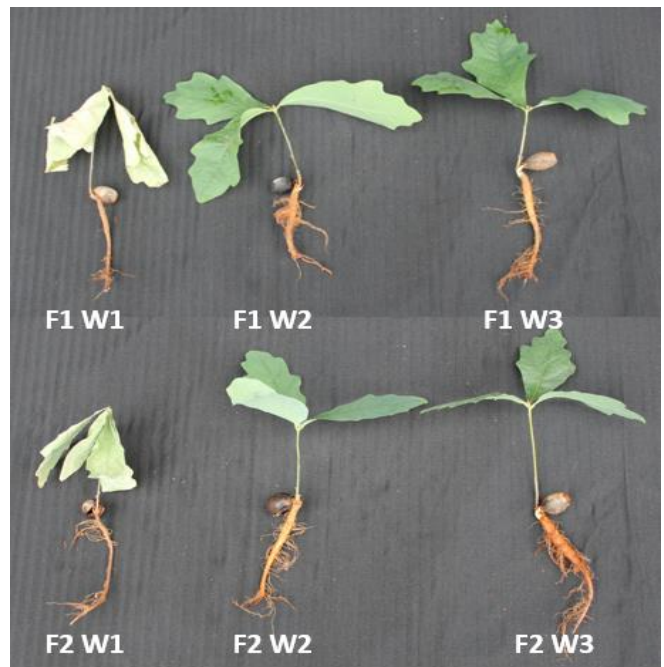
Figure 3 clearly shows the difference in root size and architecture among treatments for one representative white oak seedling per treatment.

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(W3), compared to watering to half capacity (W2) or overhead mist watering (W1).



**Figure 2.** Number of surviving white oak plants among fertilizer and watering method treatments following a 3-month cold period.



**Figure 3.** Comparison of root architecture and shoot growth among fertilizer and watering method treatments.