

NATIVE APPLE ROOTSTOCKS FOR THE MARITIME NORTHWEST AN ON-FARM TRIAL

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OVERVIEW

Grafting apple trees onto specific rootstocks has been practiced for hundreds of years, providing options for managing tree size, precocity, pest and disease resistance, and more. Yet, the diversity of commercial rootstocks today remains limited.

Malling, Geneva, Budagovsky, and other rootstocks provide various good options, but all have been selected for optimal traits in climates that differ significantly from the Maritime Pacific Northwest. In particular, none offer exceptional performance in poorly drained soils which can be typical in our wet climate.

To address this challenge, in 2017 we launched an on-farm research project to evaluate the suitability of the native Pacific crabapple (*Malus fusca*) as a rootstock for domesticated cider apple varieties. While a number of individual orchardists have dabbled with the Pacific crab as a rootstock, no previous replicated trials have been conducted to assess how widely compatible this wild native tree is with various domesticated apple varieties.

METHODS

Six *Malus* species are native to North America. In the West, the Pacific crab is abundant in maritime climates extending from Alaska to Northern California. Unique among apple species, it exhibits a wide-range of adaptability, thriving in hydric and wetland soils including saltwater estuaries, as well as in heavy clay soils, and poorly drained upland sites. It is common in both coastal rainforests, and in areas of the Olympic rain-shadow where annual precipitation averages less than 20-inches.

To evaluate the Pacific crab's rootstock compatibility with various cider apple varieties, we performed whip and tongue grafting with 50 apple varieties (primarily cider varieties), and an additional 7 pear varieties. With 10 to 12 replicates of most varieties (although limited scion wood availability in some cases resulted in fewer replicates).

RESULTS

Evaluating over a two-year timeframe:

Approximately 1/3 of the rootstocks failed, likely due to poor root structure and excessive root pruning (due to variable bare root quality of nursery stock), and due to a poor tolerance on the part of the Pacific crab for root disturbance and drying.

Overall, Pacific crab produced successful grafts with 86% of the scion varieties.

Varieties with a greater than 70% grafting success rate included: Bulmer's Norman, Domaines, Frequin Rouge, Vilibrice, Dabinette, Blanquina, Bedan des Parts, Brown Snout, Ashmead's Kernal, Normannischen Ciderbirne, Sangre de Toro, Nehou, Brown Thorn, and Amere de Berthencourt.

Varieties with a greater than 50 to 70% grafting success rate included: De la Riega, Butt Pear, Muscat de Bernay, Zabereau Reinette, Barland Pear, Reine des Pommes, Thorn Pear, Cimitere, Raxao, Kerry Pippin, Pepa, Rieneta do Caravia, and Colloas.

Varieties with a less than 50% grafting success rate included: Wickson Crab, Repinaldo do Liebana, Calville Blanc, Teorica, Perico, Court Pendu Rose, Medaille D'Or, Peil de Sapa, Hendre Huffcap Pear, Michelin, Coloradano, Manchurian Crab, Barnett Pear, Vedialona, Yellow Huffcap Pear, Peau de Vache, Blanc Mollet, Muscadet de Dieppe, Xuanina, De Bouteville, Mettais, and Jouveaux.

Varieties with no grafting success rate included: Irish Peach, Binet Rouge, Maria Elena, Solarina, Dolgo Crab, Red Pear, Old Field Pear, and Taynton Squash Pear.

Based upon our observations, Pacific crab is compatible with most apple and pear varieties. Limited success with some varieties is likely due to low quality rootstock material, rather than actual incompatibility.

RECOMMENDATIONS AND FUTURE QUESTIONS

Based upon our initial findings, the use of Pacific crab has the potential to:

- Provide a viable apple rootstock for wet and poorly drained locations in the Maritime Northwest, including eliminating the need to drain wet farm fields for crop production;
- Provide a fully fire blight-resistant rootstock – *Malus fusca* has documented polygenic resistance to fire blight;
- Foster a more 'native' and ecologically appropriate crop system, potentially supporting native soil biodiversity.

Despite these potential benefits, additional questions remain for future evaluation, including the longevity of grafting compatibility, dwarfing potential, bearing age of grafted trees, and consistency of these traits among a wild plant population.

Based on our findings we make the following initial recommendations on the use of Pacific crab as a rootstock plant:

- Due to potential root drying and disturbance sensitivity (as a wetland plant), container-grown nursery stock should be used over bare-root plants where available.
- Grafting should be conducted in the orchard (as opposed to bench grafting), after the rootstock plant has been successfully established.



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