

Sustainable Canadian Agricultural Partnership

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Appendix B:

Recommended Minimum Standards for Wind Resilient Trellis Design

Perennial Crop Development Program



Canada

1.3 PERENNIAL CROP DEVELOPMENT APPENDIX B: Recommended Minimum Standards for Wind Resilient Trellis Design Guide

INTRODUCTION

In recent years, the Prince Edward Island tree fruit industry has seen a significant increase in the acreage of high-density orchard planted. Mostly grafted onto dwarfing rootstocks, these trees cannot stand on their own and so require a stable trellis system to support their growth and keep them upright for decades of production. Designing a trellis system with the right materials is critical to ensuring the longevity of a high-density fruit orchard.

A tree fruit trellis system is subject to various stressors that may compromise its structural integrity throughout its lifespan. One such stressor – heavy winds – significantly impacted PEI orchards in September 2022 during post-tropical storm Fiona. Hurricane season in PEI coincides with the time in which many tree fruit cultivars are at or nearing peak ripeness. As trees laden with full crop loads get whipped around by gale force winds, trellis materials they are anchored to are subject to straining forces. Unfortunately, in the case of Fiona, the winds were so severe that trellis systems failed throughout some sections of multiple orchards in the province.

A heavy wind event of that scale is practically unprecedented within the recent history of the PEI tree fruit industry. However, winds at that speed (or higher) could impact PEI again. To help growers protect their fruit trees from such a future event, New Brunswick orchardist Leopold Bourgeois surveyed tree fruit growers across PEI over the 2022/ 2023 Winter to determine which trellis materials and systems were most significantly compromised and which withstood the storm. Leopold also researched relevant publications for additional information.

RECOMMENDED MINIMUM STANDARDS

The following design standards for each component of a high-density tree fruit trellis system were produced from this research. These standards should be considered when planning for future tree fruit trellis projects on PEI.

Posts:

- pressure treated wood 5-7 inches in diameter pounded or augured 4 feet in the ground, OR
- concrete posts pounded or augured 4 feet in the ground, OR
- metal pipe posts at least 2¾ inch in diameter and 3/16th inch wall thickness pounded 4 feet in the ground.

For the above three options, all posts should be spaced 25 feet apart in-row except for some concrete systems which can be spaced to 28 or 30 feet apart

Anchors:

- Anchors, with 6-foot cables installed at least 4 feet in the ground, OR
- pressure treated wood (5-7 inches in diameter) pounded or augured at least 4 feet in the ground, OR
- steel screw type anchors at least 4 feet long screwed at least 4 feet in the ground with a base of at least 10 inches and a shank rod of minimum ¾ or 1 inch in diameter.

Cables – anchor to end-post:

- 1 or 2 braided high tensile wire or stronger, OR
- 1 or 2 cables and tighteners, OR
- 3 or more trellis wires with tighteners (ideally these should be independent of the in-line wires).



In-line trellis wires:

- 3 or more 12.5-gauge high tensile wire or better tightened to about 200 to 250 psi.

Tree support rods/ conduits/ straight wires/ bamboo stakes:

- Use these if you have less than four in-line wires and attach these to the wires with proper W- clips. If four or more in-line wires are installed, most growers do not use individual vertical tree supports and instead trees are tied to the wires as they reach them.

Staples (used with pressure treated wood posts):

- The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) suggests¹ large 2-inch long galvanized, double barbed, class 3 staples with slash-cut points. Install 2 per posts about 2 inches apart on the side of prevailing winds, one at an 11 and 5 o'clock angle and the other at a 1 and 7 o'clock angle forming a V. These must not be driven home as the wire has to be able to slide freely under them. Cornell University recommends drilling through the post to install the top wire for wooden posts. This could also apply to metal posts².

Tree ties:

- Use at least two U-clips per tree (one at the top wire and one on a middle wire once the tree reaches the top wire) in combination with vinyl ties, anchor shaped elastics, plastic clips, or others 'types of ties to prevent the rubbing of tree bark on the wire.

¹ <http://www.omafra.gov.on.ca/neworchard/english/apples/9trellis.html>

² <http://www.omafra.gov.on.ca/neworchard/english/apples/9trellis.html>