

Horticulture Research Station Orchard Assessment

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Introduction

Perennial horticulture crops take years to establish. Many fruit trees can take up to five years to produce a crop and generate yield data. Once established, orchards are long-lived proving useful even with changing research requirements. Orchards also serve as important resources for education, instruction, and demonstration. This is an assessment of the orchards located at the ISU Horticulture Station.

Over the past decade, several changes have been made to the orchards. Older, freestanding, semi-dwarfed apple trees have been replaced with trellised dwarf trees. In all, the Horticulture Station has 10.8 acres of tree fruit with 10.3 acres dedicated to apple research. There are 11 orchards at the Horticulture Research Station (Figure 1). Fields 1 through 10 are apple orchards. Field 11 is a peach and pear orchard.

Orchard Information

C-52 Rootstock Trial (Field #1). This orchard was planted in 1989 to investigate the fitness of six cultivars of apples on six semi-dwarfing rootstocks. Apple cultivars include Spur Delicious, Spur Golden Delicious, Jonathan, Spur McIntosh, Chieftain, and Spartan. Rootstocks cultivars are C-52, M.7A, M.26, MM.106, and MM.111. Semi-dwarf trees take between 35 and 45 minutes each to both harvest and prune. Six rows on the west side of this planting were removed in winter 2013-2014, leaving 169 trees that were used for pathology research in 2014.

Disease-resistant Apple Trial, Leopold Center Project (Field #2). Planted in 2006, this planting consists of three cultivars on three rootstocks. Cultivars include Gold Rush, Liberty, and Red Free apples grafted to M.9, NIC 29, and T-3337. This orchard is supported by an 8-ft trellis utilizing a vertical axis training method. Trellised apples take between 15 and 20 minutes each to harvest and prune. In 2014, this orchard was used for pathology research.

2003 NC – 140 Apple Rootstock Trial (Field #3). This planting consists of Gibson Golden Delicious trees grafted to 25 different dwarfing rootstock cultivars. Rootstock cultivars are listed in the Horticulture Research Station's 2012 annual progress report. Although this orchard is trained using the vertical axis method on a trellis, it is more difficult to harvest and prune due to the differing sizes of the trees. The rootstock trial ended in 2012, and perennial alternative host plants were installed around the orchard in 2013 to increase sooty blotch disease pressure. In 2014, an irrigation system was added to increase canopy moisture in an attempt to further increase fungal disease pressure. In 2014, this orchard was used for pathology research.

Cultivar Block and Chieftain Orchard (Field #4). This orchard consists of three separate plantings. Two separate cultivar trials planted in 1976 and 1986 make up the northwest and southwest sections of this field, respectively. The long rows on the east side of this orchard are Chieftain and were planted in 1967. This planting has the oldest apple trees at the Horticulture Station. They can be seen as young trees in pictures taken in 1968 (Figure 2). Trees in this orchard are free standing, and have similar harvest and pruning times as the trees in Field 1. Many of these varieties, like

Chieftain and germplasm from the original Delicious apple from Peru, Iowa, have historical significance. This orchard was not used for research in 2014.

Cargill Trellis Orchard (Field #5). Planned as an educational orchard, this orchard was planted in 2006 using funds provided by Cargill. In this orchard, both Gold Rush and Enterprise apples are grafted on G.16 rootstock. These trees were trained to a vertical axis method on 8-ft trellises.

2007 Chieftain Trellis Orchard (Field #6). This orchard has five rows, with four rows of Chieftain apples on C.30 rootstock, and a single row of pollinators down the middle. This orchard was planted as a repository for the germplasm of the original 1967 Chieftain planting. These trees were trained using a vertical axis method on 8-ft trellises. No research was performed in this orchard in 2014.

2015 Chieftain Trellis Project (Field #7). Planting of this orchard was planned for 2015, but 200 Chieftain were grown and shipped one year early by the supplier. Since the northwest corner of this field was still being used for a multi-year bee and native pollinator study, 40 of the trees had to be potted to be planted in 2015. The 40 potted trees, pollinators, and the trellis will be installed in 2015.

Golden Delicious and Gala Trellis (Field # 8). Five rows of Gibson Improved Golden with Gala pollinators were planted in 2012, with five more rows planned for the future.

Existing trees were trellised and trained using the vertical axis method. No research was performed in 2014.

Noteworthy Cultivar Germplasm Continuation Orchard (Field #9). The NCGC orchard serves as a repository for 27 apple cultivars that are no longer propagated commercially. These trees replace trees located in the 1976 and 1986 cultivar trials in Field 4. This orchard was not used for research in 2014.

2010 NC-140 Apple Rootstock Trial (Field # 10). This orchard has Honey Crisp scion wood grafted on 30 different rootstock cultivars. Rootstock cultivars are listed in the 2013 Horticulture Research Station's annual progress report. Gala and Auvil Early Fuji on B.9 rootstock are used as pollinators. This orchard is trained using a slender spindle method. Plant density is increased with only 4-ft spacing between trees within a row. This orchard will be used to evaluate rootstock performance for the NC-140 project until 2020.

Cold Hardy Pear and Peach Orchard (Field #11). Planted in 2011 and 2013, this orchard was established to evaluate the fitness of seven cold hardy peaches on four cold hardy rootstock cultivars, as well as eight European pears and 12 Asian pears on three cold hardy rootstock cultivars. The 2013 winter was hard on both established and new trees in this orchard, especially the peaches, so grafted replacements were made to be planted in 2015. No research was performed in 2014.



Figure 1. Map showing location of 11 orchards at the Horticulture Research Station. Orchards 1 through 10 are apple orchards. Orchard 11 has peaches and pears.



Figure 2. ISU Horticulture Research Station in 1968. Chieftain orchard (Field 4 above) looking south toward the building site.