



# WYOMING APPLE PROJECT: Old trees meet new technology

Apple trees have been grown in Wyoming since at least the 1870s.

The largest orchards produced apples for market sales, rootstock trees for local residents, and even developed new cultivars that improved yield and performance under Wyoming's cold and drought-prone conditions.

For example, Lander, or "Apple City," at one time had over 4,700 trees drawn from 207 cultivars. These trees naturally aged and died or were removed, and now only a small percentage of these historical trees are still alive in Wyoming.

Recognizing how few historic trees are left triggered the University of Wyoming's Wyoming Apple Project funded by specialty crop grants from the Wyoming Department of Agriculture. The project documents and preserves what remains of 19th and early 20th century heritage apple cultivars planted in homesteads, orchards, and nurseries in Wyoming.

The hope is information about Wyoming's heritage apples will help specialty crop growers, local nurseries, and residents select

cultivars that may be more productive in Wyoming's challenging climatic conditions.

## Identifying the cultivars

The project uses genetic fingerprinting techniques to see if cultivars of historical trees could be identified. DNA markers are reliable identification tools for cultivars and for the study of similarity by assessing their genetic differences. The project also preserves some of the apple cultivars by grafting them onto vigorous young rootstocks.

Leaf samples were collected from 510 heritage apple trees from 91 sites in 19 towns in Wyoming. Genetic material from known cultivars from the USDA-National Plant Germplasm System, Seed Savers Exchange, and Washington State University apple collections were compared to the unknown heritage trees to identify cultivars.

Overall, 328 of the previously unidentified apples trees were identified to 47 known cultivars. Fifteen of these known cultivars comprised over 80 percent of

the samples identified, with all 15 originally bred or selected in states and countries with average temperatures or winter conditions similar to Wyoming (for example, Minnesota, Wisconsin, South Dakota, Russia, and Canada).

Cultivars identified most frequently were:

- 'Wealthy' was identified most (71) and occurred in the most locales across Wyoming (12) (Figure 1).
- 'Haralson' (25 trees across nine locales),
- 'Patten's Greening' (23, four locales),
- 'Yellow Transparent' (20, nine locales),
- 'Northwestern Greening' (16, seven locales).
- 'Whitney Crab' (14, eight locales),
- 'McMahan' (14, in Lander),
- 'Dolgo' (13, five locales),
- 'McIntosh Red' (13, seven locales), and
- 'Wolf River' (13, three locales).



The popularity of 'Wealthy' may be the result of its promotion in Wyoming agricultural extension bulletins from 1870-1940 and/or its preconditioning in climates similar to Wyoming.

### These are unique

The remaining 182 unknown apple trees had 146 unique genotypes. Eight were in more than two different locales in Wyoming, while nine matched unique genotypes outside the state (Arizona, California, Colorado, and New Mexico).

The cultivar 'Mart,' bred by the University of Wyoming Lander Experimental Fruit Farm around 1933, is one of these unique genotypes. 'Mart' was identified using historical records and genetic fingerprinting using records at the Murraymere Orchard in Powell. Its genetic material matched with an unknown tree in the original location where 'Mart' was bred, the University of Wyoming Experimental Fruit Farm.

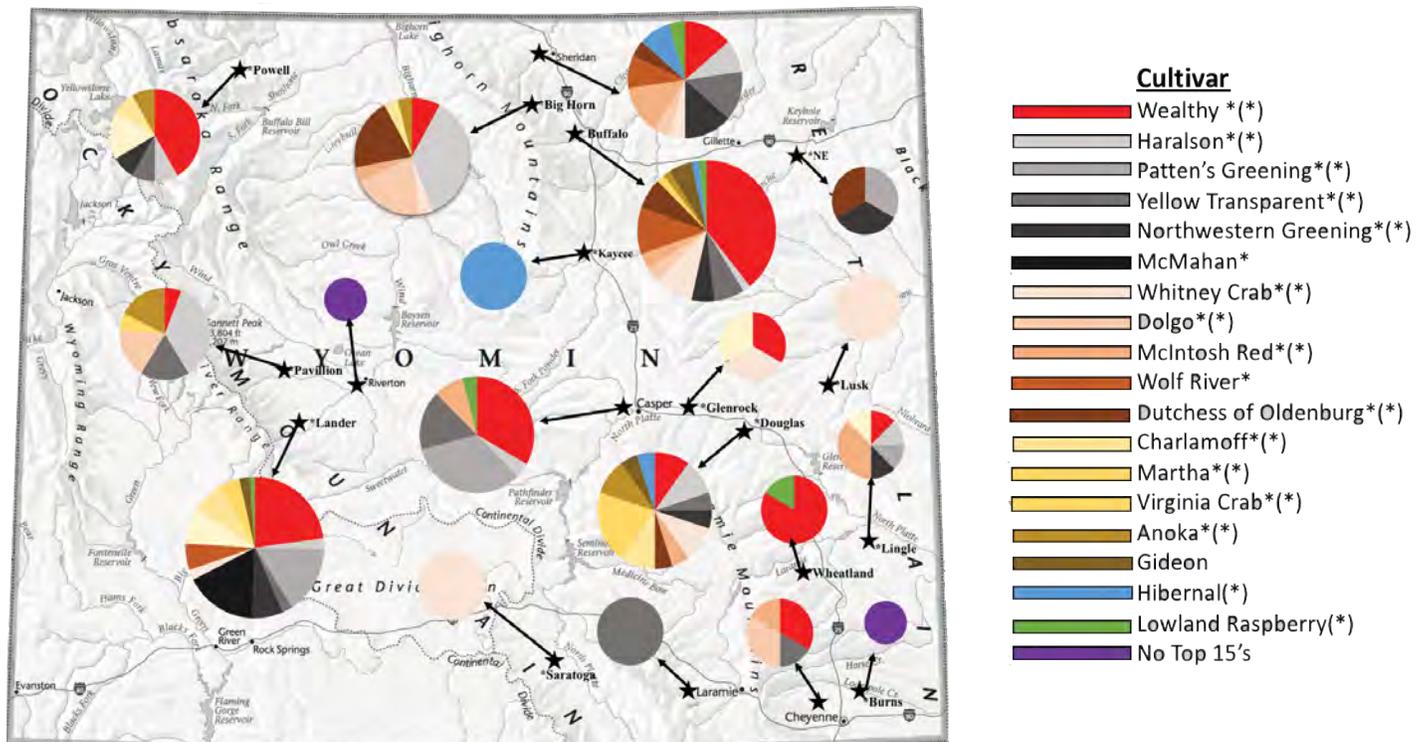
Trees of cultivars 'Brecksteinia' and 'Margaret' (both Wyoming bred) were also found in the Murraymere Orchard. The cultivar 'Mart' is now being conserved at the original University of Wyoming Experimental Fruit Farm and grafted into the Sheridan Research and Extension Center (ShREC) as a result of our research.

### Cultivars from other states

Wyoming has some of the driest and coldest winters in the lower 48 states, ranking fourth in average low

temperature and fifth in average low precipitation. Seventy-five percent of the apple cultivars identified in Wyoming originated from breeding programs in other states (Minnesota, Wisconsin, South Dakota, New York, and Illinois) and countries (Canada and Russia) with similar average low winter temperatures. Minnesota, Wisconsin, South Dakota, Russia, and Canada have mean average temperatures most comparable to those of Wyoming (for example, comparison to other states or countries from which cultivars originated in our results).

Even though trees representing cultivars in our study are aging, often in an unmaintained state, many are still producing fruit. This may suggest that despite less resistance to certain pathogens than many modern cultivars, heritage trees surviving in Wyoming could be considered for use today. Hardy cultivars such as 'Wealthy' could also



**Figure 1.** Top 15 cultivar distributions (pie charts) associated with cities (stars) from which previously unidentified heritage apple trees were sampled. Pie chart sizes correspond to the number of samples taken from that locale. Asterisks \* identify the 15 most commonly identified cultivars and the 15 cultivars found in the most (\*) locales (source cities) in Wyoming. The 'Gideon' cultivar reported in this figure tied for 15.



**Figure 2.** Past and present images of Ed Young Orchard in Lander

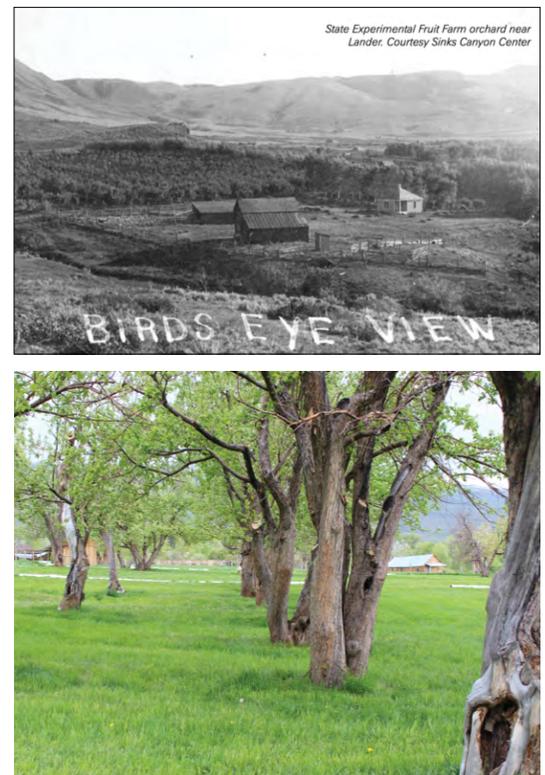
be used in breeding programs to produce new cultivars adapted to Wyoming.

Those seeking cultivars that may succeed in Wyoming could extend their search to other cultivars bred in programs in New York, South Dakota, Wisconsin, Minnesota, Russia, and Canada. This would help increase and restore the diversity of cultivars grown in Wyoming. Visit our website <http://bit.ly/wyomingappleproject>.

Cultivars previously tested at the University of Wyoming Experimental Fruit Farm from states with similar winter

conditions and recommended (excellent and/or fair) for Wyoming growing conditions are at our Wyoming Apple Project website.

Ongoing orchard restoration projects at the Ed Young Orchard (now Nanette Slingerland's Spear S Produce Company) (Figure 2) and University of Wyoming Experimental Fruit Farm (now Central Wyoming College Field Station in Sinks Canyon, Figure 3) have preserved original trees, and a Wyoming heritage apple collection is being developed at the Sheridan Research and Extension Center orchard.



**Figure 3.** Past and present images of University of Wyoming Experimental Fruit Farm Station in Lander

*Authors Jonathan Magby was a graduate assistant for Professor Steve L. Miller in the University of Wyoming's Department of Botany and graduated in December. Magby can be reached at (307) 797-5866, and Miller can be contacted at (307) 766-2834 or at [funji@uwyo.edu](mailto:funji@uwyo.edu).*

## Where to find more information on growing and preserving Wyoming apple trees?

The Wyoming Apple Project website <http://bit.ly/wyomingappleproject> was created to help support residents looking to rejuvenate and restore old orchards to further preserve heritage apple cultivars in Wyoming.

The site includes information on diseases and pests, planting (grafting, rootstocks, spacing, initial pruning, tree support, and watering), continued maintenance (nutrients, pruning, restoration, thinning fruit, training, weeds, and winter protection), harvest, and storage of apples.

You will find more information on the 218 apple cultivars mentioned in historical bulletins, including the cultivars uses (cider, dessert, kitchen and market), parentage, origin, and current availability in commercial nurseries, conservation orchards, and germplasm orchards across the United States.

We also included information on past cultivars grown in orchards and homesteads (by city and landowner), nurseries registered to sell to and/or in Wyoming, and a comprehensive list of the apple tree cultivars lost and found in the state of Wyoming.

