OSU Dry Farming Program

Corvallis, OR

Western Water Resilience Case Study

Located on the Oregon State University (OSU) campus in the heart of the Willamette Valley, the Oak Creek Center for Urban Horticulture has been a hub for dry farming innovation and education since its first dry farming demonstration in 2015. Farmers involved in this case study include OSU Assistant Professor Lucas Nebert.

Exploring Water Resilience: What was tried and learned

In 2024, the OSU Dry Farming Program deepened this dry-farming work, exploring practices of reduced tillage, summer cover cropping, and intercropping, and showcasing understudied, diverse crops that hold promise for dry farming, including delicious cucumber melons, as well as perennial versions of kale and sunflower.

A cool, wet May delayed crop emergence and increased slug pressure, but key successes emerged:

- Favorites from tastings included Lilly (çrenshaw) and True Love (cantaloupe) melon.
- Cucumber melons stayed sweet even in the heat.
- Perennial crops like kale and sunflower showed resilience, while the no-till plot, now in its third year, continued to improve.
- Dry farmed cut flowers were a great addition.

Challenges included slugs attracted by plastic mulch and poor establishment of a spring-planted clover cover crop.

Farm at-a-glance

TYPE
Educational center

AVERAGE ANNUAL PRECIPITATION
41.6 inches

SOIL TYPE
Woodburn silt loam
Available water holding capacity: 11.7 inches

CROPS
Annuals - Vegetables, legumes, grains, and flowers
Perennials - kale, oilseeds, and legumes

FARM SIZE
8,000 square feet (plot size) on 6.5 acres

LAND TENURE
Leasing 8,000 square feet from OSU Oak Creek Center for Urban Horticulture

2024 WATER RESILIENCE EXPLORATIONS
Low and no-till
Annual variety trials
Summer cover cropping
Intercropping
Perennials

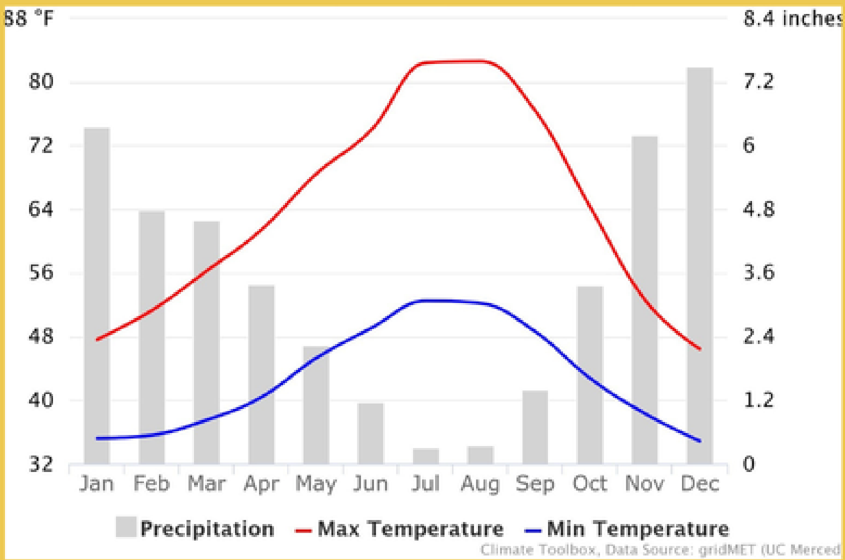
Understanding Context: Water, Climate, and Soil

This plot, located 30 yards from Oak Creek, accesses a seasonal water table 30–37 inches below the soil surface during the winter and early spring. Well water is available for irrigation and is occasionally used to establish dry-farmed crops.

In the climograph below you can see that less than 3 inches of precipitation on average fall during June through September, the dry season, which coincides with highest annual temperatures averaging from 73 to 83 degrees F. The soil is fully saturated with more than 38 inches of precipitation falling October through May.

Temperature & Precipitation (1991-2020)

Average Annual Precipitation: 41.6 inches.



The United States Department of Agriculture - Natural Resources Conservation Service Web Soil Survey originally classified this area as a Dayton silt loam, a poorly drained soil. But a 5 foot soil core assessment in 2016 revealed that the soil type is actually a Woodburn silt loam--a fertile alluvial soil. This is a very deep, moderately well-drained soil and suitable for a wide range of crops. Its characteristics support deeper root growth, making it particularly well-suited for dry farming practices. This example highlights the critical importance of conducting onsite soil evaluations when selecting a site for dry farming.

The soils at this case study site have a relatively high Available Water Holding Capacity (AWHC) of 11.7 inches in the top 5 feet. This capacity means the soil can store a substantial amount of water, allowing plants to thrive with minimal irrigation. Its structure and moisture-holding ability make it ideal for growing deep-rooted, drought-resistant crops with fewer additional inputs.

Soil Health Practices & Preparation

Fall-planted cover crop is terminated in the early spring through mowing and either shallow (6-inch depth) tillage or covering with an opaque silage tarp. In no-till treatments, a layer of wood chips was added as a mulch. In places of extra weed pressure, plastic weed barrier was used.

Organic fertility was also applied in the spring, in the form of pelletized chicken manure and gypsum.

Water Resilient Strategies Explored in 2024

This site practices dry farming, where crops are grown without irrigation after planting.

Perennials

This was the first year experimenting with perennials as part of the Dry Farming Program including perennial kale and a selection of crops in collaboration with The Land Institute's perennial Atlas Project, a citizen science initiative, which included oilseed perennials such as silphium (perennial sunflower), Lewis flax, as well as sainfoin (perennial legume).

Key Findings

- Perennial kale performed exceptionally well.
- Most of the perennials successfully established in a dry-farmed setting, including silphium, and sainfoin.
- Lewis flax faced significant germination challenges, but those that did germinate were able to establish well.

Annuals

Annual vegetable, grain, and pulse variety trials have been grown on this site since 2015. In 2024,this was expanded to explore different varieties of flowers and cucumber melons (cucumis melo).

Key Findings

- Cucumbers and Melons: Dry-farmed cucumbers and melons performed well and were highly rated in taste tests due to their ability to resist bitterness in the heat. Successes included Armenian cucumbers and the smaller, plumper Italian Leccese varieties sourced from The Cucumber Shop.
- Flowers: Dry-farmed flowers also thrived. Notable successes included zinnias, marigolds, Mexican Torch sunflowers, celosia (fiery red cockscomb), and strawflowers.

Summer Cover Cropping

The summer cover crop trials had mixed success with six species of legumes tested:

- balansa
- birdsfoot trefoil
- berseem
- sweet clover
- alyce clover, and
- subterranean clover.

Only half of the species established well. They were seeded just after a rain event but may have been buried too deep. The cover crops performed better when intercropped in shaded corn plots compared to the more exposed dry bean plots.

Key Findings

The successful species that were planted included birdsfoot trefoil, sweet clover, and subterranean clover.

Till vs. No-Till: Tomatoes and Melons

To better understand how tillage impacts the performance of dry-farmed varieties, tomatoes and melons were evaluated in till vs. no-till practices.

Melon establishment was hindered by a cool, wet May and June, as well as slugs—most plants had to be replanted. In the no-till plots, weed pressure was significant, but plastic mulch effectively controlled bindweed.

Fertility management in no-till plots remains challenging and requires more manual labor for adding amendments. In the first two years of establishing the no-till plot, there were issues with compaction and low yields.

Key Findings

- No-till melons with plastic weed fabric outperformed tilled melons without fabric.
- No-till tomatoes yielded less than tilled tomatoes.
- Taste testing standouts: 'Lily' (a Crenshaw melon) and 'True Love' (a cantaloupe).

Intercropping

Traditional cowpea-sorghum intercropping practices were also explored.

Key Findings

Cowpeas did well in the shade of the sorghum when in alternating rows, but not as well when planted in-row with sorghum.

Soil Moisture Sensors

Two different types of soil moisture sensors were tested out at this site:

- Watermark granular matrix sensors
- Irrometer tensiometers

Key Findings

The tensiometers, which rely on an internal water reservoir to function, proved ineffective in this dry-farmed setting. The reservoir frequently dried out, leading to inaccurate readings.

Looking Forward

The Dry Farming program plans to test later planting of melons with plastic mulch, and experiment with diverse species of fall-planted clover. Research will be expanded on perennials for long-term sustainability as well as no-till practices (with a focus on identifying effective fertilizers and optimal application timing).

For More Information, visit:

OSU Dry Farming Program
Dry Farming Institute Case Studies

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All photos courtesy of Amy Garrett and Lucas Nebert

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