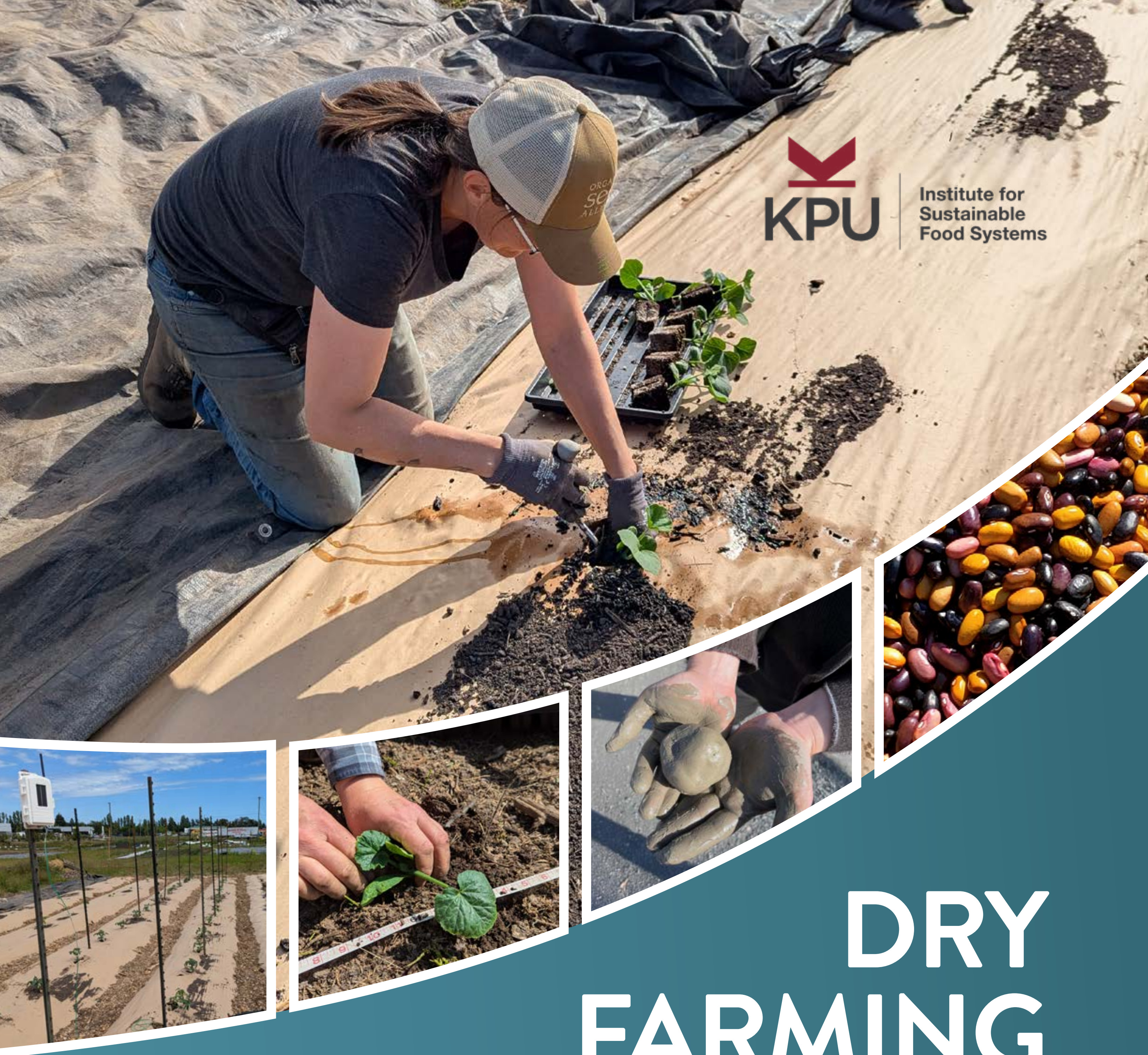

KPU Institute for Sustainable Food Systems

DRY FARMING

VANCOUVER & GULF ISLANDS

EXTENSION GUIDE

Site Suitability Toolkit and Lessons Learned from 2025 Market Garden Demonstration Sites

SFU B.C. Centre for Agritech Innovation
Pacific Institute for Climate Solutions

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About the Institute for Sustainable Food Systems

The Institute for Sustainable Food Systems (ISFS) is an applied research and extension unit at Kwantlen Polytechnic University that investigates and supports regional food systems as key elements of sustainable communities. Our applied research focuses on the potential of regional food systems in terms of agriculture and food, economics, community health, policy, and environmental integrity. Our extension programming provides information and support for farmers, communities, business, policy makers, and others. Community collaboration is central to our approach.

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PART 1

DRY FARMING: KEY PRINCIPLES

What is Dry Farming?

Dry farming means growing crops without, or with very little, supplemental irrigation by relying on the conservation of soil moisture. In the spring, the soil is saturated from winter rains or snowmelt. Dry farming employs a suite of practices to preserve **plant-available** soil moisture for crop growth throughout the growing season.

What is Evapotranspiration?

Evapotranspiration (ET) is the combined loss of water held in the soil through the following:

1. *Evaporation: where water is lost directly from the soil surface*
2. *Transpiration: where water is first taken up from the soil by a plant and released through the plant's leaves through pores called "stomata"*

Evaporation + Transpiration = Evapotranspiration

Note: Generally, the majority of water loss in the soil occurs from transpiration, while relatively small amounts of water are lost through evaporation.

Dry Farming vs Dryland Farming

Dry farming describes unirrigated crop production in areas where annual precipitation is greater than 50% of potential ***evapotranspiration*** *(i.e. where precipitation can refill soil moisture reserves annually), and most of the precipitation falls outside of the growing season.*

In contrast, dryland farming refers to unirrigated crop production in semiarid areas where annual precipitation is generally less than 50% of the potential evapotranspiration.[1]

Key Soil Science Concepts for Dry Farming

1. Soil is Made of Weathered Rock, Organic Matter, and Space.

Soil has 3 important components

1. **Mineral Soil:** This part of the soil is made up of weathered rock.
2. **Organic Matter:** This part of the soil is made up of highly decomposed or decomposing plant material like roots, compost, etc.
3. **Space:** The spaces between soil particles are filled with either water or air.

2. The Mineral Soil is a Mix of Sand, Silt, and Clay Particles.

Sand, silt, and clay particles are the building blocks of the mineral soil. One of the most important differences between these three soil particle types is their size. Sand particles are the largest. You can often see larger sand particles with the naked eye and feel the individual grains between your fingers. Clay particles are the smallest, only visible under a microscope. Silt particles are smaller than sand, and larger than clay.

3. Soil Texture is the Relative Proportion of Sand, Silt, and Clay Particles.

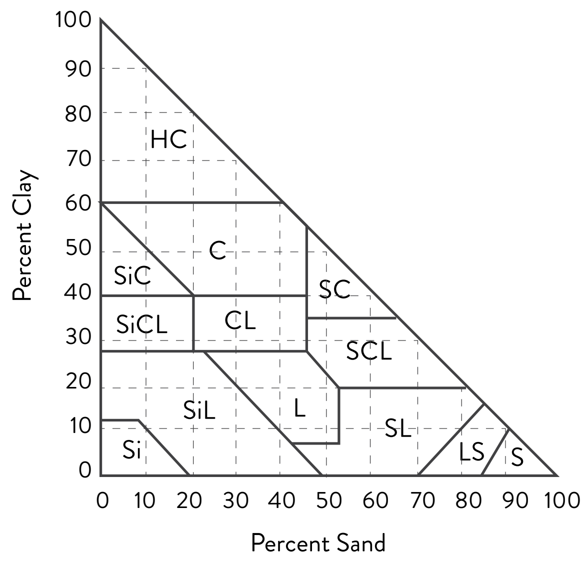
Soil is a mix of sand, silt, and clay particles, and the *relative proportion* of these particles will determine a given **soil texture.** The texture of a given soil sample can be determined using the Canadian soil texture triangle below (Figure 1) if the percentage of sand, silt, and clay are known. For example, a soil sample that is found to have 40% sand particles, and 20% clay particles (and therefore the remaining 40% is composed of silt particles) is categorized as a loam, indicated with the letter "L" in Figure 1.

Soil texture can be assessed in a laboratory or approximated by using the "jar test". See Appendix A.

Figure 1. Canadian System for Soil Classification.

Abbreviations for Soil Texture:

HC: heavy clay
C: clay
SiC: silty clay
SiCL: silty clay loam
CL clay loam
SC: sandy clay
SiL: silt loam
L: loam
SCL: sandy clay loam
SL: sandy loam
Si: silt
LS: loamy sand
S: sand



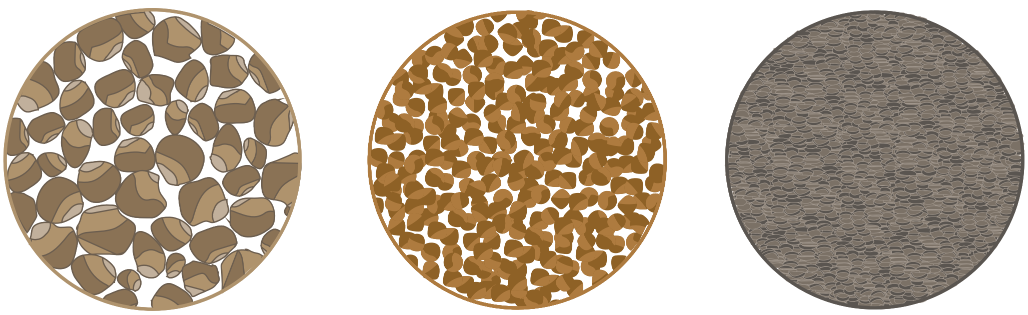
Adapted from the Canadian System of Soil Classification 3rd edition Figure 42.[2]

To identify the texture classification, first use the jar test (Appendix A) to estimate the percentage of sand, silt, and clay particles in your soil sample. Then, find the percentage of sand particles indicated by the jar test on the x axis of the triangle. Next, find the percentage of clay particles as indicated by the jar test on the y-axis of the triangle. Follow the dotted lines at each of these points to where they intersect in the triangle. Identify the 2-3 letter texture code in the triangle describing the area where these two lines intersect.

4. Pore Spaces Store Plant-Available Water in the Soil.

Importantly, each type of particle, sand, silt, and clay, will also influence the size of the space, or "pores", between soil particles.

Figure 2. Relative Pore Spaces Between Sand, Silt, and Clay Particles



Sand	Silt	Clay
Large particles and pore sizes	Medium particles and pore sizes	Small particles tightly packed with very small spaces between them

Not all water held in the soil pore spaces is available to plants. The soil is like a sponge, and, like a sponge, it has different sized pores where water is held. Water held in the largest pores, such as between sand particles, is easily drained by gravity, quickly moving deeper into the soil and beyond the reach of plant roots.

On the other end of the spectrum, water held in the smallest pores, such as those between some clay particles, can be held so tightly that plant roots can't extract it. It's the water in the medium-sized pores that is readily available to plants, called **plant-available water**. In these "medium-sized" pores, the water is often held tightly enough to prevent drainage by gravity, but not so tightly that plant roots cannot extract it.

5. Different Soils Store Different Quantities of Plant-Available Water.

Different soils will have different abilities to store **plant-available water**. A very sandy soil will have a greater proportion of large pores, which drain easily by gravity, and therefore have less capacity to store **plant-available water.** In contrast, a heavy clay soil will have many tiny pores that, combined, can store a lot of water. BUT these tiny pores hold on to soil water very tightly. In some cases, plant roots cannot take up water from these tiny pores. Therefore, heavy clay soils can retain a lot of water overall, but much of this water is not available to plants.

Generally, the soil textures that can store the most **plant-available water** are moderately fine textured soils such as loams, silt loams, silty clay loams, and similar textured soils.

Soil Texture vs Soil Structure and the Influence on Plant-Available Water

Soil texture *refers to the relative proportion of sand, silt and clay particles. Soil texture cannot be changed with management practices.*

Soil structure *refers to how sand, silt, and clay particles "clump" together to form larger* **soil aggregates***. Soil structure can be influenced with management practices (see Part 2.2 Soil Health).*

Both soil texture and soil structure impact the soil's capacity to store **plant-available** *water because both can influence the presence of medium-size pores that store plant-available water.*

Medium-sized pores occur in soils with medium-sized particles (like silt) but also in soils where particles "clump" together to form larger structures or soil aggregates. This is because when soil particles clump together in aggregates, space is created between the aggregates where plant-available water can be stored.

Both clay particles, which are naturally "sticky", and organic matter are important for promoting soil aggregation. Soil aggregates are a key component of healthy soils and can be promoted with management practices (see Part 2. Soil Health).

PART 2

SITE SUITABILITY

Not all sites are suitable for dry farming. The following factors are important when determining site suitability.

1. Available Water Holding Capacity

This describes the capacity of soil to hold sufficient plant-available water in the soil profile within the reach of plant roots. Oregon State University recommends a minimum soil water holding capacity of 8 inches of water down to 5 ft depth.[3]

Link to Online Soil Moisture Holding Capacity Calculator

The ISFS has developed an online tool to support estimating available water holding capacity using soil texture and other key physical soil properties. See link here: https://www.kpu.ca/dry-farming-resources.

Soil core (5ft) sampled from Sandown Centre for Regenerative Agriculture, North Saanich BC.
Photo credit: Naomi Robert

2. Soil Health

Soil health describes the capacity of the soil to function as a living ecosystem through good soil structure and by providing good habitat for beneficial living organisms. This guide focuses on two important and interrelated, aspects of soil health—**bulk density** and **aggregate stability.**

Bulk Density

Bulk density indicates the proportion of pore space in the soil relative to solid soil particles. It is an indication of soil compaction. In-field assessment resources for bulk density can be found in Appendix B.

Relevance For Soil Health & Dry Farming

Increasing bulk density usually indicates several undesirable characteristics for soil health and dry farming including reduced pore space for storing moisture and a more difficult environment for plant roots to penetrate and thrive. Table 1 illustrates the bulk density values that can impact root growth in different soil textures. Furthermore, higher bulk densities will result in lower water infiltration rates from any rainfall and/or irrigation events.

What Affects Bulk Density?

Both natural factors and management will impact bulk density. For example, finer textured soils (e.g. silt loam, clay loam) will tend to have naturally lower bulk densities relative to coarser textured soils (e.g. sandy loam). Management can also impact bulk density. For example, soils will become compacted from sustained tillage, the sustained use of heavy machinery use, and from working on the soil when it is too wet. Soil exposed to these management practices will have higher bulk densities.

Bulk Density Can Change With Depth

Generally, bulk densities tend to be higher deeper into the soil. This is because there is usually less organic matter, fewer soil aggregates, fewer roots, fewer soil organisms, and more compaction from the overlying soil layers.

On Southern Vancouver Island, some regions have very dense, compacted sub soil layers that have formed from dense layers of sand, silt, and clay deposited by glaciers.

Table 1. General Relationship of Soil Bulk Density to Root Growth Based on Soil Texture

Soil Texture	Ideal Bulk Density for Plant Growth (grams/cm^3)	Bulk Density That Affects Root Growth (grams/cm^3)	Bulk Density That Restricts Root Growth (grams/cm^3)
Sandy, loam sand	<1.60	1.69	>1.80
Sandy loam, loam	<1.40	1.63	>1.80
Sandy clay loam, clay loam	<1.40	1.60	>1.75
Silt, silt loam	<1.40	1.60	>1.75
Silt loam, silty clay loam	<1.40	1.55	>1.65
Sandy clay, silty clay, clay loam	<1.10	1.49	>1.58
Clay (>45% clay)	<1.10	1.39	>1.46

*Table reproduced from United States Department of Agriculture Natural Resources Conservation Centre Soil Bulk Density, Guide for Educators.[4] *Does not apply to red clayey soils and volcanic ash soils.*

Aggregate Stability

Aggregate stability describes how strongly soil particles are held together in soil aggregates. **In-field assessment resources for aggregate stability can be found in Appendix C.**

Relevance For Soil Health & Dry Farming

More stable aggregates are able to resist compaction, wind and water erosion, and promote better root penetration, water infiltration and water storage. This is because when soil particles clump together in aggregates, space is created between aggregates. Well-aggregated soils therefore can store air and water not just between individual soil particles, but also between soil aggregates. Additionally, roots can readily grow in the spaces created by soil aggregates.

What Affects Aggregate Stability?

Management practices have a big impact on **aggregate stability**. The organic matter in the soil and the activities of beneficial soil organisms (e.g. earthworms) help to form stable soil aggregates. Stable aggregates are also promoted by avoiding activities that break them up, such as avoiding sustained mechanical tillage.

Dry farmed squash and tomato at Yellow Boot Farm, Black Creek, July 2025. Photo credit: Jaclyn Kirby.

3. Climate

The climate of a given region will impact dry farming site suitability. Oregon State University[5] provides guidance indicating the most suitable climates have the following characteristics:

- Minimum 510 mm precipitation annually
- Maximum 1270mm of potential evapotranspiration annually
- Minimum 100 frost-free days annually

SUMMARY

The following soil physical characteristics increase and decrease dry farming site suitability.

Table 2. Site Characteristics Impacting Dry Farming Site Suitability

Characteristics That Improve Site Suitability	Characteristics That Reduce Site Suitability
• Moderately fine soil texture e.g. loam, silt loam, and clay loam • High levels of organic matter • Lower bulk densities • Low stoniness • High levels of aggregate stability • Deep soil profiles	• Very sandy soils • Heavy clay soils • Low levels of organic matter • High bulk densities and compacted soils • High stoniness • Low levels of aggregate stability • Shallow soil profiles and the presence of impermeable layers e.g. hardpan

Table 3 summarizes site suitability information for the three trial site locations. The soil physical properties and climatic conditions of all three sites indicated dry farming potential, although the notable compaction and stoniness at the Black Creek site may indicate reduced suitability relative to the sites on Salt Spring Island and in North Saanich.

Table 3. Site Suitability Characteristics of 2025 Demonstration Sites

Site Characteristic	Yellow Boot Farm, Black Creek	Tardigrade Seeds, Salt Spring Island	Sandown Centre for Regenerative Agriculture, North Saanich[6]
			
SOIL PHYSICAL PROPERTIES			
Soil Textures	Silt Loam	Clay Loam	Clay Loam
Stoniness	High	Low	Low
Estimated AWHC	Approx. 5″ in the first 3 ft	Approx. 9″ in the first 5 ft	Approx 9″ in the first 5 ft
SOIL HEALTH			
Bulk Density	1.33 g/cm^3	1.0 g/cm^3	1.15 g/cm^3
Aggregate Stability	0.66	0.62	0.44
Soil Organic Matter %	18.6%*	3.8%	8.9%
CLIMATE			
Annual Precipitation[7] (average 1981-2010)	1154mm	987mm	883mm
Annual potential evapotranspiration[8] (2020 – 2025)	849.8mm	584.4mm	777.4m
Annual-Frost-Free Days[9] (1991-2020)	218 days	235 days	213 days

* elevated soil organic matter likely result of sampling error

PART 3

DRY FARMING DEMONSTRATION SITES 2025

1. Cultivar Selection

Seed selection for the 2025 demonstration (Table 4) prioritized drought-tolerant cultivars of common market garden crops that could be easily integrated into farmers' production and marketing without requiring additional consumer education. Additionally, we prioritized organic and locally-produced seeds where possible to support the likelihood of success in local conditions.

Table 4. Selected Crops And Cultivars For 2025 Demonstration Sites

Crop	Cultivar
Tomato	Big Beef
	Spring King
	BHN-871
	Oh Canada
Winter Squash	Early Remix
	Tetsukabuto
Dry Bean	Anasazi
	Beefy Resilient Grex
Zucchini	Dark Star

Dry farmed squash and tomato at Tardigrade Seeds, Salt Spring Island, August, 2025. Photo credit: Skye Larmour.

2. Dry Farming Practices

Farmers did not irrigate, with the exception of hand watering once during transplanting. Dry farming demonstration sites used the following practices to conserve soil moisture.

Organic Matter

Organic matter increases the capacity of the soil to hold water. All farmers added organic matter to their soils at the beginning of the season after tillage events in the form of compost. The amount applied ranged from 1-2" deep, leaving the compost on the soil surface. The farmers also used organic amendments such as blood meal, bone meal, and alfalfa pellets, which were worked into the soil during transplant.

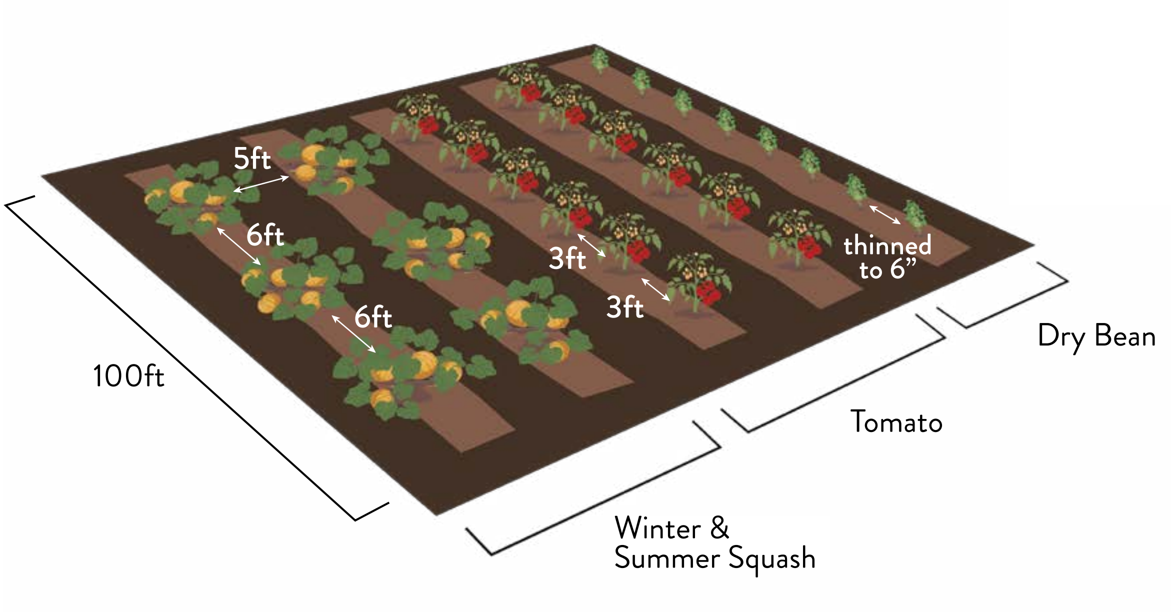
Weed Management

Weeds compete with crops for soil moisture.Keeping dry farmed areas weed-free is important for moisture conservation. Farmers employed different weed management methods including mulching with paper, straw, and regular hand weeding.

Adapted Plant Spacing

Using larger spacing between plants can provide a larger area for plant roots , facilitating a larger soil moisture reserve for each plant. See the schematic below to see the plant spacing between different crops used during the 2025 demonstration sites.

Figure 3. Dry Farming 2025 Demonstration Site Design



3. Data Collection

At each demonstration site, the ISFS installed

- One Wireless Vantage Pro2 (Davis Instruments) weather station to monitor temperature, humidity, rain, wind speed, and solar radiation

- Two soil moisture monitoring stations, each station with four Watermark sensors placed at 1, 2, 3, and 4 feet depth (total of eight sensors per site)

Participating farmers collected the following data throughout the growing season

- Cultivation practices, including bed preparation, in-season cultivation practices, timing and quantity of amendments
- Yield data including quantity (by weight) and percentage marketable and unmarketable as per farms' assessments
- Incidence of blossom end rot in tomato, which has been noted to occur at increased rates in dry farmed systems

Photo credit: Naomi Robert

In-ground sensors monitored changes in soil moisture at 1ft, 2ft, 3ft and 4ft depths

Photo credit: Naomi Robert

Weather stations monitored site conditions

PART 4

LESSONS LEARNED & NEXT STEPS

Lessons Learned

1. While the top layer of soil dried out, there was sufficient moisture at depth to mature the market garden crops without supplemental irrigation.

The soil and site conditions varied between locations, highlighting the importance of understanding site conditions for successful dry farming. Soil moisture was highest throughout the season at the Salt Spring Island site (Figure 5). This site had relatively deep and fine textured soils, which increased the capacity of the soil to retain moisture. Additionally, the Salt Spring site was located in a valley bottom which may have encouraged water from adjacent slopes to flow down into the site. The Black Creek site had the driest soils (Figure 4). The subsoil at the site was notably compacted below 30cm, which likely impacted the capacity of the soil to hold water and the capacity of plant roots to penetrate deeper into the soil and absorb water. While the timing and depth of soil water depletion varied between sites, there was sufficient moisture at each site to mature selected market garden crops.

A Tip For Interpreting Soil Moisture Graphs

As the soil becomes drier, the remaining water is held increasingly tightly by the soil. *Therefore, the drier the soil, the harder it is for plant roots to absorb water from the soil.*

Because of this relationship, soil sensors can measure the force required to break the bonds that hold water in the soil. We use this as a proxy to estimate the amount of plant-available water in the soil.

These graphs therefore show soil water tension, measured in a unit called 'kilopascals" or -kPa (suction or negative pressure) on the y-axis. Higher tension values (-kPa) on the y-axis correspond to drier soil conditions.

Farmer Skye Larmour planting squash transplants at Tardigrade Seeds, Salt Spring Island. Photo Credit Naomi Robert

ISFS Research & Extension Associate Micheal Robinson taking soil sample. Photo credit: Naomi Robert

Soil Moisture at Yellow Boot Farm, Black Creek, June–October 2025

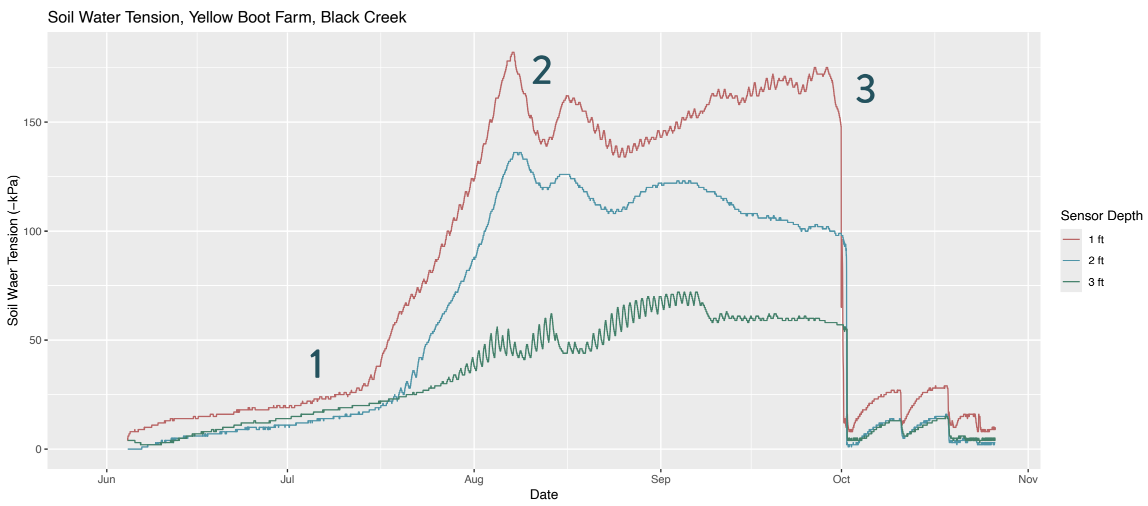


Figure 4: Soil water tension at 1 ft, 2ft, and 3ft depths at Yellow Boot Farm between June and Oct. The soil was too compact and stony to install a 4ft sensor at this site.

1. As plant roots reach the depth of each soil moisture sensor, water is taken up by plants and soil water tension levels increase more rapidly.
2. A precipitation event in August causes soil water tension to decrease temporarily
3. Fall rains return in October and replenish soil moisture and sensors return to 0kPa.

Soil Water Tension at Tardigrade Seeds, Salt Spring Island, June–October 2025

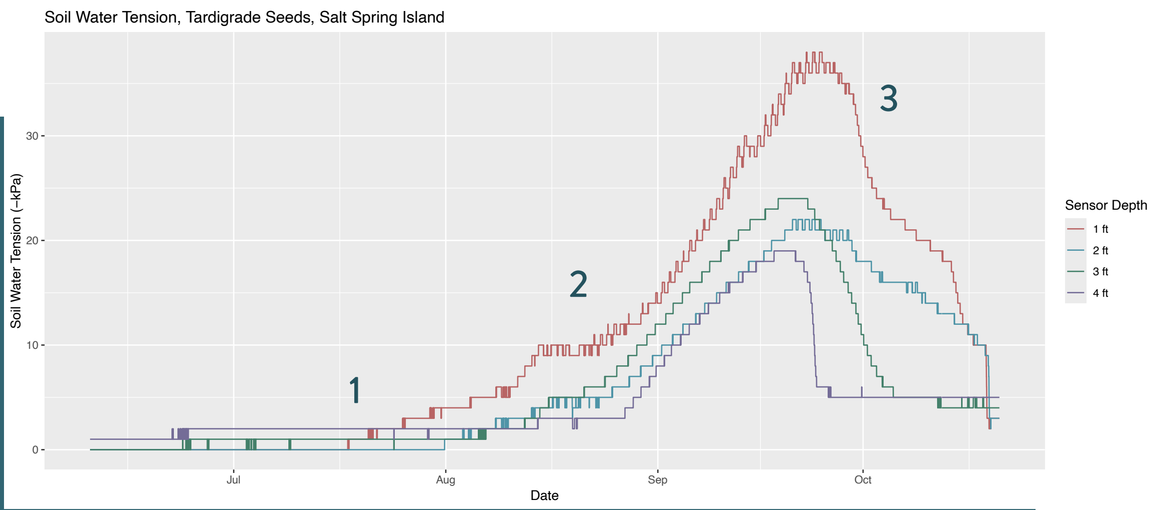


Figure 5: Soil water tension at 1 ft, 2ft, and 3ft, and 4 ft depths at Tardigrade Seeds, Salt Spring Island, between June and Oct.

1. Soil water tension was low as soil conditions remained relatively moist throughout the majority of the growing season at the Salt Spring Island site.

2. Soil water tension begins to rise more rapidly in August.

3. Fall rains return September-October and replenish soil moisture and soil water tension sensors return to 0kPa.

2. The harvested yields for each crop for each site met or exceeded yields found in Oregon State University dry farming trials.

Demonstration sites were not intended to assess dry farming economic viability. However, yields harvested met or exceeded those in Oregon State University's dry farming program.[10] For tomato, there was significant variation between farms both in yield and percent marketable fruit. However, Big Beef stood out as the consistent performer between all three sites and with limited losses from blossom end rot and other imperfections. On Salt Spring Island, where soil moisture levels were high, the winter Squash Testsukabuto yielded much higher than the OP Early Remix. In North Saanich, where soil moisture provided some yield limitations, we saw the yields between cultivars come closer together. For dry bean, there was no appreciable difference in yield between cultivars or between sites.

Table 5. Yield Data From 2025 Demonstration Sites

	Tardigrade Seeds	Yellow Boot	Sandown
Big Beef	138 lb	135 lb	146 lb
% marketable	88	99	79
Yield per 100'	276 lb	270 lb	292 lb
BHN-871	165 lb	98 lb	125 lb
% marketable	98	96	90
Yield per 100'	330 lb	196 lb	250 lb
Spring King	174 lb	71 lb	109 lb
% marketable	70	87	83
Yield per 100'	348 lb	142 lb	218 lb
Oh Canada	185 lb	121 lb	158 lb
% marketable	79	61	79
Yield per 100'	370 lb	242 lb	316 lb
Dark Star	236 lb	64 lb	227 lb
% marketable	58	88	78
Yield per 100'	983 lb	256 lb	908 lb
Tetsukabuto	577 lb	93 lb	177 lb
% marketable	70	100	100
Yield per 100'	565 lb	97 lb	184 lb
Early Remix	150 lb	30 lb	210 lb
% marketable	62	100	100
Yield per 100'	208 lb	42 lb	292 lb
Grex Beans	5 lb	2.5 lb	5.9 lb
Yield per 100'	10 lb	5 lb	11.8 lb
Anasazi Beans	5 lb	5 lb	9.2 lb
Yield per 100'	10 lb	10 lb	18.4 lb

Note: 100' yield data was extrapolated from demonstration site plantings. These ranged in size from 24' for summer squash to 50' for most tomato and dry bean.

3. The climatic conditions at each site over the growing season were fairly similar and reasonably suited to dry farming. Therefore, variations in performance between demonstration sites highlight the importance of management practices and site conditions.

The climatic conditions were relatively similar between sites. From May-October, average daily temperatures were approximately 17-18°C, and total season evapotranspiration ranged from 410mm – 497mm. The higher exposure at the North Saanich site, and consequent higher wind speeds, could account for the relatively higher evapotranspiration at this site. Therefore, variations in yield are likely consequences of differing in site conditions and management practices, highlighting the importance of these for dry farming success on Vancouver and the Gulf Islands.

Table 6. Summary of Weather Conditions at Demonstration Sites

	Evapo-transpiration	Rainfall	Average Windspeed	Growing Degree Days Base 18.3 C
North Saanich May 24-Oct 1 2025	497.6 mm	93mm	6.5Km/hour	362.4
Black Creek May 29-Oct 1 2025	438.4mm	136.8mm	2Km/hour	369.2
Salt Spring May 24-Oct 1 2025	410.1mm	93.23mm	2Km/hour	450

Next Steps

These demonstrations raised the following questions for future research to improve our understanding of dry farming as a climate change adaptation strategy for market garden farming on Vancouver and the Gulf Islands.

- What are the economic costs and benefits of dry farmed relative to irrigated market garden production systems?
- How does dry farming impact fertility management?
- What place-based guidelines and practices for dry farming can improve soil moisture conservation in this region?
- What extension programming is needed to continue to build capacity for local soil moisture conservation and reduce the need for supplemental water applications?

CONCLUSION

As climate change continues to intensify drought conditions and farmers experience seasonal water stress, there is an increasing need to develop and understand farming methods that reduce dependence on supplemental water application and conserve and protect freshwater resources. Dry farming and soil moisture conservation, where sites are suitable, present promising tools in this region for farmers seeking to

- expand production with limited irrigation access
- support allocation decisions for farmers with limited water resources
- support producers, such as new entrants, seeking to minimize capital costs

There is a need to further develop place-based knowledge, practices, and guidelines for dry farming on Vancouver and the Gulf Islands to support water conservation, farm viability, and ecological stewardship.

Glossary

Cultivar ("cultivated variety")

A plant cultivated for desired traits through selection and improvement.

Evapotranspiration

The combined loss of water from the soil through evaporation from the soil's surface and through uptake and release through a plant's leaves.

Growing Degree Days

A measure of accumulated heat measured as accumulated degrees above a specified threshold and often used to predict plant development and growth.

Plant-Available Water

The water stored in soil pore spaces that can be extracted by plant roots. Plant- available water is stored in soil pores that are small enough to prevent drainage by gravity, yet large enough to allow extraction by plant roots.

Soil Texture

The relative proportion of sand, silt, and clay particles in a soil. Soil textures can be classified according to the Canadian soil texture classification system (Figure 1). Examples of common agricultural soil textures on Vancouver Island include "loam", "sandy loam", "silt loam", etc.

Soil Aggregates

Soil particles that have clumped together into larger structures. Soil aggregates are essential for soil health, water infiltration and water movement, aeration, drainage, and the soil's capacity to store plant-available water.

Soil Structure

The arrangement of soil particles into larger aggregated formations or "clumps".

Appendix A

Resource for how to estimate soil texture using the "jar method".

Appendix B

Resource for how to calculate soil bulk density.

Appendix C

Info sheet for how to use Slakes app to assess aggregate stability.

Appendices A through C can be found online at https://www.kpu.ca/dry-farming-resources.

Appendix D

Why is it that as the soil becomes drier, the remaining water is held increasingly tightly? Water molecules comprise both hydrogen and oxygen (chemical formula H2O). The hydrogen atoms in water have a positive charge, and the oxygen atoms have a negative charge. Soil however, has an overall negative charge. This leads to two important ways in which water is held in soil pores against the force of gravity.

1. The positive hydrogen atoms in one water molecule will attract negative oxygen atoms in other water molecules. This type of bond is called a hydrogen bond. It is what holds water droplets together.

2. The negative charge of soil particles attracts positively charged hydrogen atoms in water and they bond. These bonds are stronger and harder to break relative to the hydrogen bonds above.

Plant roots must overcome these bonds to absorb water from the soil.
Inside a given soil pore, the closer the water is to direct contact with a soil particle, the stronger the forces holding the water in the pore, and the harder it is for plant roots to absorb it. In contrast, the water at the center of the pore is relatively easy for plant roots to absorb and this water will therefore be absorbed first.
As the soil becomes drier, the remaining water is held increasingly tightly by the soil. Therefore, the drier the soil, the harder it is for plant roots to absorb water from the soil. If the soil continues to dry without additional water, eventually only the most tightly bonded water molecules will remain and plant roots will not be able to absorb any more water from the soil.

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[2]Source: Soil Classification Working Group. 1998. The Canadian System of Soil Classification, 3rd ed. Agriculture and Agri-Food Canada Publication 1646, 187 pp https://sis.agr.gc.ca/cansis/taxa/cssc3/chpt17.html

[3]See https://dryfarming.org/map/

[4]USDA Natural Resources Conservation Centre Soil Bulk Density/Moisture/Aeration, Soil Health Guides for Educators. Retrived from https://www.nrcs.usda.gov/sites/default/files/2022-10/Soil%20Bulk%20Density%20Moisture%20Aeration.pdf

[5]See Dry Farming Suitability Map of Oregon by Desiree Braziel at https://dryfarming.org/map/

[6]The Sandown Centre for Regenerative Agriculture hosts the Farmfolk Cityfolk Seed Hub Site.

[7]See Government of Canada climate normals 1981-2010 station data for Comox A, Saltspring St Mary's L, Victoria Int'l A https://climate.weather.gc.ca/climate_normals/index_e.html

[8]Annual potential evapotranspiration date source:
https://dashboard.bcagriweather.ca/ see North Courtenay, Saltspring2, Victoria Airport

[9]Frost free days data source: https://www.plantmaps.com/ (see Ganges) and
https://climate.weather.gc.ca/climate_normals/index_e.html (see Comox and Victoria Airport)

[10]Oregon State University Dry Farming program is the most established dry farming research and extension program on the Pacific West Coast.
See https://smallfarms.oregonstate.edu/sites/agscid7/files/bean_variety_handout.pdf
https://smallfarms.oregonstate.edu/sites/agscid7/files/tomato_variety_handout.pdf
https://smallfarms.oregonstate.edu/sites/agscid7/files/squash_handout_2020.pdf

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