

# Dryland farming

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**Dryland farming** and **dry farming** are agricultural techniques for non-irrigated cultivation of crops. Dryland farming is associated with drylands - dry areas characterized by a cool wet season followed by a warm dry season.



Dryland farming in the Granada region in Spain

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## Dryland farming locations

Dryland farming is used in the Great Plains, the Palouse plateau of Eastern Washington, and other arid regions of North America such as in the Southwestern United States and Mexico (see Agriculture in the Southwestern United States and Agriculture in the prehistoric Southwest), the Middle East and in other grain growing regions such as the steppes of Eurasia and Argentina. Dryland farming was introduced to southern Russia and Ukraine by Slavic Mennonites under the influence of Johann Cornies, making the region the breadbasket of Europe.<sup>[1]</sup> In Australia, it is widely practiced in all states but the Northern Territory.

## Dry farming locations

Dry farming may be practiced in areas that have significant annual rainfall during a wet season, often in the winter. Crops are cultivated during the subsequent dry season, using practices that make use of the stored moisture in the soil. California, Colorado and Oregon, in the United States, are three states where dry farming is practiced for a variety of crops.<sup>[2]</sup><sup>[3]</sup>

## Dryland farming crops

Dryland farmed crops may include winter wheat, corn, beans, Sunflowers or even watermelon. Successful dryland farming is possible with as little as 9 inches (230 mm) of precipitation a year; higher rainfall increases the variety of crops. Native American tribes in the arid Southwest survived for hundreds of years on dryland farming in areas with less than 10 inches (250 mm) of rain. The choice of crop is influenced by the timing of the predominant rainfall in relation to the seasons. For example, winter wheat is more suited to regions with higher winter rainfall while areas with summer wet seasons may be more suited to summer growing crops such as sorghum, sunflowers or cotton.<sup>[4]</sup>



Fields in the Palouse, Washington State

## Dry farmed crops

Dry farmed crops may include grapes, tomatoes, pumpkins, beans, and other summer crops. These crops grow using the winter water stored in the soil, rather than depending on rainfall during the growing season.<sup>[2]</sup>

## Dryland farming process

Dryland farming has evolved as a set of techniques and management practices used by farmers to continually adapt to the presence or lack of moisture in a given crop cycle. In marginal regions, a farmer should be financially able to survive occasional crop failures, perhaps for several years in succession. Survival as a dryland farmer requires careful husbandry of the moisture available for the crop and aggressive management of expenses to minimize losses in poor years. Dryland farming involves the constant assessing of the amount of moisture present or lacking for any given crop cycle and planning accordingly. Dryland farmers know that to be financially successful they have to be aggressive during the good years in order to offset the dry years.

Dryland farming is dependent on natural rainfall, which can leave the ground vulnerable to dust storms, particularly if poor farming techniques are used or if the storms strike at a particularly vulnerable time. The fact that a fallow period must be included in the crop rotation means that fields cannot always be protected by a cover crop, which might otherwise offer protection against erosion.

## Dry farming process

Dry farming depends on making the best use of the "bank" of soil moisture that was created by winter rainfall. Some dry farming practices include: <sup>[2]</sup> <sup>[6]</sup>

- Wider than normal spacing, to provide a larger bank of moisture for each plant.
- Controlled Traffic
- No-till/zero-till or minimum till
- Strict weed control, to ensure that weeds do not consume soil moisture needed by the cultivated plants.
- Cultivation of soil to produce a "dust mulch", thought to prevent the loss of water through capillary action. This practice is controversial, and is not universally advocated.
- Selection of crops and cultivars suited for dry farming practices.

## Key elements of dryland farming

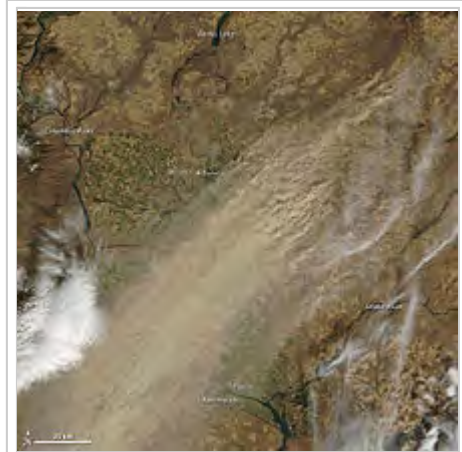
**Capturing and conservation of moisture** – In regions such as Eastern Washington, the average annual precipitation available to a dryland farm may be as little as 8.5 inches (220 mm). Consequently, moisture must be captured until the crop can utilize it. Techniques include summer fallow rotation (in which one crop is grown on two seasons' precipitation, leaving standing stubble and crop residue to trap snow), and preventing runoff by terracing fields.

"Terracing" is also practiced by farmers on a smaller scale by laying out the direction of furrows to slow water runoff downhill, usually by plowing along either contours or keylines. Moisture can be conserved by eliminating weeds and leaving crop residue to shade the soil.

**Effective use of available moisture** – Once moisture is available for the crop to use, it must be used as effectively as possible. Seed planting depth and timing are carefully considered to place the seed at a depth at which sufficient moisture exists, or where it will exist when seasonal precipitation falls. Farmers tend to use crop varieties which are drought and heat-stress tolerant, (even lower-yielding varieties). Thus the likelihood of a successful crop is hedged if seasonal precipitation fails.

**Soil conservation** – The nature of dryland farming makes it particularly susceptible to erosion, especially wind erosion. Some techniques for conserving soil moisture (such as frequent tillage to kill weeds) are at odds with techniques for conserving topsoil. Since healthy topsoil is critical to sustainable dryland agriculture, its preservation is generally considered the most important long-term goal of a dryland farming operation. Erosion control techniques such as windbreaks, reduced tillage or no-till, spreading straw (or other mulch on particularly susceptible ground), and strip farming are used to minimize topsoil loss.

**Control of input costs** – Dryland farming is practiced in regions inherently marginal for non-irrigated agriculture. Because of this, there is an increased risk of crop failure and poor yields which may occur in a dry year (regardless of money or effort expended). Dryland farmers must evaluate the potential yield of a crop constantly throughout the growing season and be prepared to decrease inputs to the crop such



Dryland farming caused a large dust storm in parts of Eastern Washington on October 4, 2009. Courtesy: NASA/GSFC, MODIS Rapid Response<sup>[5]</sup>

as fertilizer and weed control if it appears that it is likely to have a poor yield due to insufficient moisture. Conversely, in years when moisture is abundant, farmers may increase their input efforts and budget to maximize yields and to offset poor harvests.

## Arid-zone agriculture

As an area of research and development, arid-zone agriculture, or desert agriculture, includes studies of how to increase the agricultural productivity of lands dominated by lack of freshwater, an abundance of heat and sunlight, and usually one or more of extreme winter cold, short rainy season, saline soil or water, strong dry winds, poor soil structure, over-grazing, limited technological development, poverty, political instability.

The two basic approaches are

- view the given environmental and socioeconomic characteristics as negative obstacles to be overcome
- view as many as possible of them as positive resources to be used



An example of a dryland farming paddock

## See also

### Areas

- Palliser's Triangle (semiarid area of Canada)
- Goyder's Line
- Agriculture in Israel

### Historical examples

- Dust Bowl
- Agriculture in the prehistoric Southwest (United States and Mexico)

### Research

- Arid Forest Research Institute
- International Center for Agricultural Research in the Dry Areas
- University of Arid Agriculture (in Rawalpindi in Pakistan)

### Techniques

- Biosalinity
- Irrigation
- Seawater greenhouse
- Sustainable agriculture

- Xeriscaping

## Other

- Xerophyte

## Notes

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3. "Dry farming vegetables". *OSU Small Farms*. Oregon State University. Retrieved 27 April 2016.
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6. Garrett, Amy. "Common misconceptions and key points about dry farming: Case study of dry farmer with more than 40 years of experience". *OSU Small Farms*. Oregon State University. Retrieved 28 April 2016.

## Further reading

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- Steve Solomon, *Water-Wise Vegetables: For the Maritime Northwest Gardener* (Sasquatch Books, 1993).

## External links

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Categories: Agriculture by type

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