Fact Sheet
NO. 14 JANUARY 1999

Planning and Managing Irrigation

Tips for Small Acreages in Oregon

Irrigation Water: Use It Wisely or Lose It

We are reminded of the magic of water during the hot, dry summer months in Oregon. Irrigation water, or the lack of it, determines the land use options on our properties. If you have the good fortune to have irrigation water, you can conserve this precious resource by preventing over-irrigation. Over-irrigation wastes water, electricity, and your money. It creates runoff that carries soils, fertilizers, and pesticides into lakes and streams. It can also leach water and fertilizers below plant roots. Many communities are finding nutrients and other contaminants in their groundwater. Poor irrigation practices are one cause. Read on to find out about good irrigation management.

A Water Right Is a Must

You can irrigate a half-acre or more of land, if you have a water right. To find out whether your property has a water right, contact your local watermaster or the Oregon Water Resources Department at (503) 378-8455. Have your tax lot number handy.

A Water Source Is a Must

Before you invest in an irrigation system, find out if you have an adequate water source. Many private wells supply 5 to 10 gallons per minute. In general, you will need **5 to 20 gallons per minute from a well or stream** or **2 to 4 acre-feet of water in a farm pond per acre irrigated.** Low volume systems conserve water and may require less water. Be sure to review your irrigation system plan with irrigation dealers when you are buying equipment.

Warning: Irrigation Ditch

As subdivisions build next to irrigation ditches, conflict between landowners and irrigation districts has grown. Problems occur when:

- Homeowners use unauthorized pumps to water lawns.
- Yard trimmings are thrown into ditches to rot.
- Irrigation districts scrape landscaping from banks to maintain ditches.
- Scenic waterways are covered and put into pipes to conserve water.
- Children and pets enter culverts and are injured.

Irrigation districts have the right to maintain and manage irrigation ditches. You should be aware of district policies and establish safety rules for your children. If you have questions or concerns, contact your local irrigation district for more information.

Test the Waters

The water quality of irrigation water can determine what crops you can grow. Here's why:

- High salt levels in irrigation water can build up in soils and hurt crops.
- Excess minerals may tie up fertilizers when using the irrigation system to apply fertilizers.
- Sand and silt may wear down irrigation parts.

For more information on the testing and use of poor quality irrigation water, see the Oregon State University publication *Irrigation Water Quality* (FG 76).

"If there is magic on this planet, it is contained in water."

- Loren Eisley

USDA Natural Resources Conservation Service

This fact sheet was produced by the Washington County Soil and Water Conservation District (SWCD) and the Small Acreage Steering Committee. The Governor's Watershed Enhancement Board, the Oregon Association of Conservation Districts, and the USDA Natural Resources Conservation Service funded the project. Media Works of Bozeman, Montana designed the fact sheet.

What's Your Irrigation Type?

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Type	Considerations	Efficiencies, Costs, and Recommendations
Surface - row crops, nurseries, pastures		
Furrow - water moves down crop rows by gravity and discharges at end. Border - water moves down field diked by borders and discharges at bottom. Wild flooding (pastures) - water moves downhill and into low spots.	Not always suited for sandy soils. Need slopes less than 3 percent for row crops and slopes less than 10 percent for sod. Little equipment needed, no spray-drift problems. Uneven water amounts at top and bottom of field. Will always have tailwater runoff, some losses up to 50 percent.	60 to 80 percent of water reaches plant roots. Low initial costs, can construct short dikes with shovel, low energy costs. Recommend flooding surface less than 24 hours, using largest, nonerosive flow to get desired advance time, and reusing tailwater.
Sprinkler - various crop types		
Periodic movement (short crops) - e.g., rolling wheel lines. Constant movement (all crops except trees and vineyards) -e.g., big gun on a traveler. Solid-set and permanent (all crops) - e.g., in-ground or aboveground systems with sprinklers along a pipe.	Works on slopes up to 30 percent. Significant drift and evaporation can occur at winds more than 15 miles per hour. Need setbacks to prevent spray from drifting onto buildings and roads. Hand lines require labor for each set-up; physically demanding. Salty irrigation water may harm plants.	70 to 80 percent of water reaches plant roots. Moderate to high initial purchase costs, moderate to high energy costs. Recommend reducing runoff and leaching with lower application rates, longer set times, and more laterals. 80 to 90 percent of water reaches plant roots.
Low Volume - vegetables, flowers, trees, shrubs		
Trickle and drip - use emitters or drip tubes to apply small amounts of water to plants over long period of time. Microspray - small sprayers that may use less water than sprinklers.	Works on most slopes. Limits tillage. Provides consistent moisture, little runoff, and less leaching if managed properly. No spray drift problem. Can combine irrigation fertilizer and pesticide applications.	High initial installation and maintenance costs, low to moderate energy costs. Recommend high level of management to take advantage of system benefits.

Adapted from *Soil and Water Conservation Engineering,* Schwab et.al

Good irrigation management results in low runoff, minimal leaching below the plant roots, and no erosion. To know how much and when to irrigate, consider these simple guidelines:

Know How Much Your System Applies

If you are a **sprinkler irrigator**, there are simple ways to determine your application rate. Install a flowmeter or follow these easy steps:

1. Find three to five straight-sided cans. Use coffee cans, tuna cans, or other containers with the same diameter.
2. Space the cans at even intervals and in a line running away from the sprinkler. Place the last can near the edge of coverage.
3. Irrigate for 1 hour.
4. Add up the water depths in all of the cans and divide by the number of cans to find the number of inches applied per hour.

For example, 4 cans caught a total of 2 inches of water over an hour. Divide 2 inches by 4 cans. Your application is 0.5 inch of water per hour.

If you are a **surface irrigator**, QT=Ad is a quick equation that you can use to determine your application rate. Q is the flow in cubic feet per second, T is the time in hours, A is the area in acres, and d is the gross application in inches. For example if you apply 1 cubic foot per second to 10 acres for 24 hours, then you would have applied 2.4 inches. Use a flume or weir to measure Q. For more information, see the Oregon State University publication *Estimating Water Flow Rates* (EC1369).

Apply Water at Rates That the Soil Can Absorb

Typical soil uptake rates are:

Soil Type	Soil Uptake Rate (inches/hour)
Sand	2 to 4
Sandy loam	1 to 3
Silt loam, loams	0.25 to 1.5
Silty clay loams, clay	0.1 to 0.3

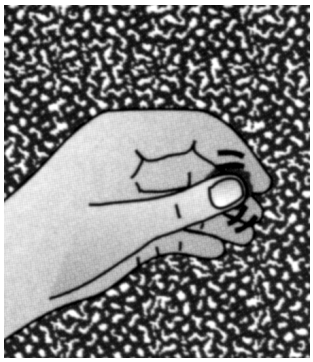
Apply Water According to Soil Moisture in the Root Zone

One way to determine when to irrigate is to check soil moisture. It's time to water when soils have lost more than 50 percent of the water available to plants in the root zone. Root zones for pasture, corn, alfalfa, and orchards are 2, 3, 4, and 6 feet deep, respectively. Use soil probes, tensiometers, gypsum blocks, or the feel method to test soil moisture. The steps for the feel method follows:

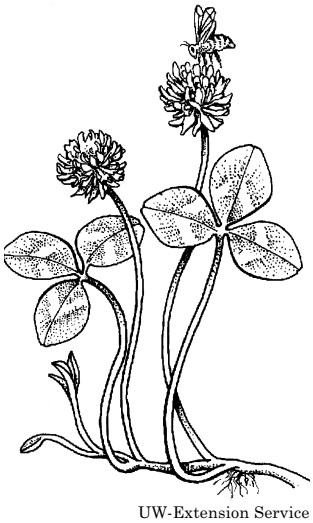
1. Use a shovel or soil auger to take a soil sample from the root zone.
2. Test soil moisture. Soils have certain characteristics when they have more than 50 percent available water. Sandy soils tend to ball under pressure. Loamy soils form a ball and will "slick" or show water at the ball surface. Clay soils form a ribbon.
3. Irrigate if soils appear to have less than 50 percent available water.
4. During irrigation, probe the soil. A probe easily penetrates wet soil. Stop irrigating when the root zone has filled with water.

Apply Water According to Crop Needs

In general, annual crops will use a **net application of 1 to 1.5 inches** of available water per week in the summer. If the application efficiency of your irrigation system is 50 percent, you will need to provide a **gross application of 2 to 3 inches** of water per week. Critical irrigation times are during flowering, seed fill, and fruit set. One way to determine when to irrigate is to use a "checkbook" system that estimates soil water by accounting for crop water use, soil moisture, and rainfall. For more information, see the Oregon State University publication *Irrigation Scheduling* (PNW288).



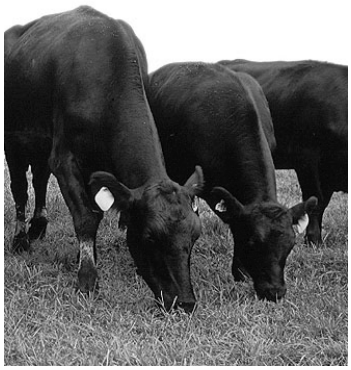
Montana Stream Management Guide



UW-Extension Service

Check out Your Irrigation System

Good irrigation management includes good system upkeep. Before spring start-up, make sure that pumps, valves, sprinkler heads, and other parts are in good working condition. During the irrigation season, watch the system operate, repair worn or broken components, and reposition system spacing for better coverage. After the irrigation season, winterize your system.



USDA Agricultural Research Service

Irrigated Pastures: The Grass *Is* Greener

If you irrigate pasture or hay, here are some irrigation tips:

- **Plant drought-resistant grasses.**
  Tall fescue, smooth brome, and perennial ryegrass are the most drought-tolerant grasses. Orchardgrass and timothy are moderately tolerant. Meadow foxtail and Kentucky bluegrass are the least tolerant.
- **Graze properly for a drought-tolerant pasture.**
  Grass needs a certain amount of leaves above ground to support roots below ground. Do not allow livestock to graze grass lower than 3 inches. When grazing removes too many leaves, roots may die, and the pasture will be less drought tolerant.
- **Irrigate hay and pasture during critical periods.**
  For hay growers, water is essential before the first cutting in western Oregon, and before the second cutting in eastern Oregon. For pasture folks, water is important in the spring. If grass develops good root systems during these critical periods, it will be more drought-tolerant.
- **Exclude livestock during irrigation and until soil surface dries.**
  When soils are wet, livestock compact the earth, reduce water infiltration, and crush root growth.
- **Irrigate in the early morning.**
  Water use is more efficient because winds tend to be calmer, temperature is lower, and evaporation is less.
- **Control weeds.**
  Unwanted plants compete with grasses and clovers for moisture.
- **Reduce nitrogen applications during drought.**
  Under normal weather conditions, split nitrogen applications for the most efficient use of this nutrient. During drought conditions, reduce nitrogen applications by 25 to 50 percent. Normal amounts of phosphate, potash, and sulfur are still needed.

Saving Fish, One Fish Screen at a Time

What's wet, deadly, and eats young fish? An unscreened irrigation diversion. Unscreened diversions suck in young fish and reduce our fish populations even further. State law requires irrigators to screen diversions that divert more than 30 cubic feet per second. In some areas of the state, the **Oregon Department of Fish and Wildlife (ODFW) cost-shares fish screen installations** on diversions less than 30 cubic feet per second. For more information, find your local ODFW office through the phone book's blue pages under state government. .

- The local soil and water conservation district and USDA Natural Resources Conservation Service may provide on-site advice on irrigation management. Contact your local office by looking in the blue pages under Federal Government in the phone book.
- Oregon State University Extension Service offers publications, workshops, and over-the-phone assistance on irrigation management and crop production. Contact your local office by looking in the phone book's blue pages under State Government