Use ET information correctly

Identify the ET variable first, then use it with crop, soil, rainfall, and irrigation-system information.

START WITH THE CORRECT ET VARIABLE

ET_{ref}: reference ET

Weather-driven demand from a standard reference surface. ET calculated for a standardized, well-watered reference surface from weather data. ETo uses short grass; ETr uses tall alfalfa. It expresses atmospheric demand, not the field crop's water use.

K_c: crop coefficient

A dimensionless multiplier that relates a crop and growth stage to a specific ET reference. Use a Kc developed for the same reference basis as the ETref data.

ET_c: crop ET under standard conditions

A calculated estimate for a well-managed, unstressed crop: $ET_c = K_c \times ET_{ref}$. It is not a direct field measurement.

ET_a: actual ET

Water consumed through evaporation and transpiration under actual field conditions. It may be measured with research instruments or estimated by models, including satellite-based models, and can differ from ETc.

HOW ET ENTERS A SOIL-WATER BALANCE

1 Define root-zone storage

$$TAW = AWC \times Z_r$$

Use available water capacity (AWC) and effective root depth (Zr) in compatible units.

2 Estimate standard crop ET

$$ET_c = K_c \times ET_{ref}$$

Skip this multiplication if a trusted service already reports ETc.

3 Update root-zone depletion

$$D_{today} = D_{previous} + ET_c - P_e - I_{net}$$

Use effective rain (Pe) and net irrigation (Inet); include other important gains or losses.

4 Convert a chosen refill to runtime

$$\text{Gross depth} = \text{net refill} / E_a \mid \text{Runtime} = \text{gross depth} / \text{application rate}$$

Set the trigger and refill target from crop tolerance and root-zone storage; use measured system performance.

Do not mix ET reference types

A crop coefficient developed for grass-reference ETo cannot be applied directly to alfalfa-reference ETr. A mismatch can bias the crop-water estimate throughout the season.

Before using an ET value

- Identify whether the value is ETref, ETc, or ETa.
- Confirm units, accumulation period, and date.
- If it is ETref, verify the Kc source, crop stage, and reference basis.
- If it is ETc, verify which Kc curve and crop stage were used.
- Use local rain and measured net irrigation in the water balance.
- Keep the result within root-zone and system limits.

WHAT ET DOES NOT MEASURE

ET does not measure the water your system delivered, its uniformity, or the water stored in the root zone. Check those separately with flow, runtime, catch-can, soil-sampling, or field-checked sensor information.

Worked example

- ET_{ref} = 0.24 in/day and K_c = 0.85, so ET_c = **0.20 in/day** (0.204 unrounded).
- Four-day ET_c = **0.82 in** (4 x 0.204); effective rain = 0.05 in.
- Net refill = 0.77 in; at 80% efficiency, gross depth = **0.96 in**.
- At 0.40 in/hour, runtime = **2.4 hours**.

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Identify what the ET source reports

Reference ET, calculated crop ET, and satellite actual ET are different variables. They are not interchangeable products.

DIFFERENT VARIABLES, DIFFERENT USES

Weather-station reference ET (ETref)

REPORTS Weather-based ETo (grass) or ETr (alfalfa) for a standardized reference surface.

Use: Multiply by a compatible crop coefficient to estimate ETc.

Check: Station representativeness, time period, missing data, and reference type.

Published crop ET estimate (ETc)

REPORTS A predefined crop-coefficient curve already applied to station ETref; AgriMet crop charts are one example.

Use: Daily or weekly crop-water-use estimates when the crop and growth dates represent the field.

Check: Crop, station, reference basis, and emergence or start, full-cover, cutting, harvest, or termination dates.

Satellite-based actual ET estimate (ETa)

REPORTS Modeled field-scale ET under observed surface and crop conditions, often from a multi-model ensemble.

Use: Spatial patterns and monthly or seasonal field review; daily estimates carry greater uncertainty.

Check: Observation count, field boundaries, model spread, clouds, date availability, and known issues.

FOUR QUESTIONS BEFORE USING A NUMBER

01 Variable
Is the number ETref, ETc, or ETa? Do not relabel one as another.

02 Basis
Is the reference grass or alfalfa, and is any Kc compatible with it?

03 Period
Is the value daily, weekly, monthly, seasonal, or cumulative?

04 Assumptions
Which station, crop curve, dates, field boundary, or model produced it?

OREGON TOOLS AND THEIR ROLES

AgriMet
USBR weather network; station ETref and crop ET charts

WSU Irrigation Scheduler
Soil-water balance scheduling using AgriMet and OpenET data

OpenET
Satellite-based actual ET at field scale

OSU Ag Water Chatbot
Plain-language guidance; experimental

Scan for the live Oregon tool directory

ET is not irrigation depth

- ET is water consumed over a stated period; it is not the depth delivered by the system.
- Irrigation need also depends on effective rain, root-zone storage, and the refill target.
- Gross depth and runtime require measured system performance plus field and delivery constraints.

PRACTICAL BOUNDARY

ET is an estimate, not a command. Do not report or apply more precision than the station, model, crop coefficient, rain estimate, soil information, or system measurement can support.

Technical basis: FAO 56; OSU EM 9717, EM 9868, and EM 9873; NRCS CPS 449 (2026); AgriMet; OpenET Collection 2.1. Reviewed August 2026.

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