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WATER MANAGEMENT – FRUIT TREES AND OTHER PLANTS

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Did you know that a large apple tree, on a hot summer day, will use about 50 gallons of water?

DAILY WATER USE (in gallons per day ET)

Plant or ft.^{2} cover ↓ / ET in./day →	0.10/day, cool day in early spring or late fall, foggy	0.20 in./day, warm day in spring or fall, some fog	0.25 in./day, hot day in mid-summer, no fog	0.30 in./day, very hot (100°F), windy, mid-summer
1 ft. ^{2}	0.062	0.125	0.156	0.187
4 ft. ^{2} 1 yr. old fruit tree	0.25	0.50	0.62	0.75
10 ft. ^{2}- 2 yr. old fruit tree	0.62	1.25	1.56	1.87
36 ft. ^{2} 3 yr. old fruit tree	2.25	4.5	5.61	6.73
75 ft. ^{2} grapevine, mature (table)	4.65	9.4	11.7	14.0
100 ft. ^{2} semi dwarf mature or 4 yrs. old	6.2	12.5	15.6	18.7
200 ft. ^{2} 2 ft. wide 100 ft. row raspberry	12.4	25.0	31.2	37.4
300 ft. ^{2} large std. mature tree	18.6	37.5	46.8	56.1
400 ft. ^{2} 4 ft. wide 100 ft. row strawberry	24.8	50.0	62.4	74.8
1 acre solid cover	2715	5431	6788	8146

To water optimally you must know:

Daily water use – called ET (Evapo-transpiration) in inches per day.

Soil type – to estimate water holding capacity (inches of water available to plants)

a) clay – one ft. of soil depth holds 2.0 to 2.5 in. of water
b) loam – one ft. of soil depth holds 1.5 to 2.0 in. of water
c) sand – one ft. of soil depth holds 1.0 to 1.5 in. of water

3. Amount of water applied:
   a) Drip irrigation gal./hr. (measure emitter output)
   b) Sprinkler irrigation in./ft.2. Place several "tin" cans in the sprinkler pattern and measure inches of water/time.
4. The area a plant covers in square feet (ft.2) to the drip line (% canopy)
5. Rooting depth: soil depth down to an impermeable layer, usually.
6. Statistics:

a) 1 acre inch = 27,154 gal

b) 1 acre = 43,560 ft.2

7. Efficiency adjustments must be made for young trees under drip irrigation. Two to 3 times more water should be applied to small trees less than 20% full size, gradually reducing the adjustment until trees reach 70% full cover.

For drip irrigation, water is applied on a daily basis to supply just what the tree is using everyday without providing an excess for storage. Start irrigating in early spring before much soil moisture has been used because this stored water may be needed later in case the system is accidently shut down. Soil type or depth is almost inconsequential, and only 25-40% of the rooting area need be wetted for good tree performance.

Example: A young semi-dwarf fruit tree, two years old, and occupying a space of 10 ft.^{2}. It has two 1 gal./hr. emitters, and on a warm spring day the water use rate is about 0.20 in./day (ET).

How much: 1.25 gal./day (TABLE) times a factor of about 2.5 for an efficiency adjustment on young trees (10-15% canopy) = 3.13 gal./day.

How often: 3.13 gal./day divided by 2 emitters = 1.56 hrs. every day

Example: A mature standard size (large) fruit tree occupying an area of 300 ft.^{2} with four 1 gal./hr. emitters per tree. A hot summer day using 0.25 inches of water per day (ET).

How much: 0.156 gal./day (TABLE) x 300 ft. ^{2} = 46.8 gal./day

How often: Every day, 46.8 divided by 4 emitters = 11.7 hours
Every other day = 23.4 hours

For sprinkler irrigation, water is not applied daily, but on a periodic basis to fill the soil, which acts as a storage reservoir for water available to the plant. Soil type and rooting characteristics are very important. Recent research shows beneficial results from irrigating at or before 50-75% depletion of the (soil-stored) available water, then applying what has been used + 20% for efficiency loss.

Example: A mature standard size (large) fruit tree occupying an area of 300 ft.^{2}. A rooting depth of 3 ft., loam soil, and a daily water use (ET) of 0.25 in./day in July.

How much: 3 ft. rooting depth x 2" of available water per feet = 6" of available water
6" x 75% depletion = 4.5" = amount of water to apply + 20% = 5.4" 300ft^2 divided by 43,560 ft^2 x 27,154 gal./acre in. x 5.4" = 1,010 gal./300 ft^2 (for that tree) or 146,360 gal. per acre.

How long: Set open "tin" cans under sprinklers and measure how long it takes to apply 1 in. of water x 5.4 in. = the duration of set

How often: 5.4 inches of water divided by 0.25 inches of water used per day – 21 days. 1,010 gal. of water per tree divided by 46.8 gal. of water used per day = 21 days