

Appendix 5: Critical Periods for Soil Water Stress by Crop

Apples: During spring growth, flowering, fruit set and development

Arugula: During vegetative growth

Basil: Maturity, to prevent stress-induced flowering

Beans: Flowering, seed set, pod development

Beets: Regular water as roots develop

Broccoli: Head development

Brussels Sprouts: Vegetative and sprout development

Cabbage: Head development

Carrots: Early root development, regular water to prevent cracking

Cauliflower: Head development

Cilantro: During vegetative growth

Collards: During vegetative growth

Corn: During crown root development, at pollination and kernel development

Cucumbers: Flowering and fruit development

Eggplant: All stages

Fennel: Bulb development

Kiwifruit: During spring growth, flowering, and fruit set

Leeks: All stages

Lettuce, head: Head development, pre-harvest

Lettuce, leaf: All stages, pre-harvest

Melons: Flowering and fruit set

Onions, garlic, shallots: During bulb enlargement

Parsley: All stages

Parsnips: Early root development

Peas: Flowering, pollination, pod enlargement

Pears: During spring growth, flowering and fruit set

Peppers: All stages, but allow dry-down between waterings

Plums: During spring growth, flowering, fruit set and development

Potatoes: Tuber enlargement, from flower to die-back

Pumpkins: Flowering, fruit set and development

Radishes: All stages

Small grains: During crown root development, heading, flowering

Squashes (summer and winter): Flowering, fruit development


Tomatoes: All stages, but especially flowering and fruiting

Flowers: Bud development through flowering, and pre-harvest

Appendix 7: Irrigation for Various Vegetable Crops




 SHALLOW ROOTS – 6 to 24 inches

 MEDIUM ROOTS – 24 to 40 inches

 DEEP ROOTS – more than 40 inches

Arugula: Frequent shallow water to maintain flavor and succulence and support rapid growth.	 SHALLOW
Asparagus: Water deeply and infrequently. Allow to dry down between watering.	 DEEP
Basil: Somewhat thirsty. Important to water prior to harvest.	 MEDIUM
Beans, fresh: Can drink lots of water because they are fast growing. Once fruit is set, can often “finish” the crop with less or no water to enhance flavor. Vulnerable to disease with overhead water.	 MEDIUM
Beans, dry: Treat as fresh beans until seeds begin to mature, then gradually cease application of water.	 SHALLOW
Beets: Give adequate supply of water as lack thereof during warm weather causes plants to bolt or beet roots to crack and become tough and woody.	 MEDIUM
Broccoli: Commercial growers use 1-1-1/2” per week. Extra water during crown development will add bulk to the harvest.	 SHALLOW
Brussels Sprouts: Not very efficient at water uptake so require evenly moist soil to function at best. 70-80% of the roots are concentrated at top 8-12” of soil.	 SHALLOW
Cabbage: Needs even moisture or heads will crack. Not very efficient at water uptake.	 SHALLOW
Cabbage, Napa: Keep ground moist.	 SHALLOW
Carrots: Need deep watering until later stages of root development, at which time excess water can cause roots to crack. Cracking is also caused by too great a fluctuation between wet and dry.	 MEDIUM
Cauliflower: Keep soil evenly moist.	 SHALLOW
Celery: Thirsty like celery, but more tolerant of wet/dry swings.	 SHALLOW
Celery: Thirsty; needs frequent irrigation to get well established. Do not overhead water because susceptible to fungal disease. Heavy feeder.	 SHALLOW
Chard: Likes moist roots, bolts from water stress.	 MEDIUM
Cilantro: Keep moist to forestall bolting.	 SHALLOW
Corn: Adequate moisture is critical from tasseling through kernel formation and harvest. Do not over water dry corn (e.g., popcorn and ornamental) at maturity; let it dry out on stalk.	 SHALLOW
Cucumber: Sensitive to disturbance. Needs consistently moist soil, watered at base. Susceptible to fungal disease spread through wet leaves. Lack of water when fruits are developing will cut down on production.	 SHALLOW TO  MEDIUM
Eggplant: Need sufficient moisture. Will always benefit from supplemental fertility.	 MEDIUM
Fennel: Likes adequate moisture but not demanding.	 MEDIUM

Appendix 7 (cont): Irrigation for Various Vegetable Crops

 SHALLOW ROOTS – 6 to 24 inches
 MEDIUM ROOTS – 24 to 40 inches
 DEEP ROOTS – more than 40 inches

Flowers: Root depth and water needs vary by species. Generally important to supply regular water during bud formation and flowering.

Garlic: Likes steady supply of water. Stop watering several weeks before harvest to reduce succulence and therefore reduce rot during drying.

 SHALLOW

Kale: Average water needs, except during warm weather when more water is required to prevent wilting.

 MEDIUM

Kohlrabi: Must have even moisture to be tender.

 SHALLOW

Leeks: Never let the soil dry out.

 SHALLOW

Lettuce: Water consistently to avoid bitter taste.

 SHALLOW

Musk melons: Like a constant supply of moisture. Susceptible to foliar disease, so avoid overhead watering.

 MEDIUM

Onions: Steady supply of moisture; if too dry, onions get a strong unpleasant flavor. Avoid water on leaves to minimize downy mildew.

 SHALLOW

Parsley: Somewhat thirsty.

 SHALLOW

Parsnips: Water lovers.

 DEEP

Peas: need adequate moisture at flowering and pod enlargement. Avoid water on leaves to minimize mildew.

 MEDIUM

Peppers: Constant and even moisture from flower through fruit. Peppers like to dry down before being watered again. Will always benefit from supplemental fertility.

 MEDIUM

Potatoes: Even moisture. This is especially critical during period of tuber enlargement which begins at blossom. Cut back on water as vines die back, to cure the skins.

 SHALLOW

Pumpkins: Water deep and infrequent.

 DEEP

Radishes: Need adequate moisture – dry soil results in tough, woody radishes, and vulnerability to flea beetles. Moisture swings cause cracking.

 SHALLOW

Rutabaga: Provide even moisture. Roots will become tough as a result of the development of extra xylem cells if always forced to bring water up from a deep soil level.

 DEEP

Salad mix: Water consistently for succulent growth and to avoid bitter taste.

 SHALLOW

Spinach: Keep evenly moist to forestall bolting.

 SHALLOW

Squash, summer: Rapid growth and ongoing fruit production requires frequent deep water.

 MEDIUM

Squash, winter: Do well with deep and infrequent waterings. Avoid overhead water to prevent foliar disease.

 DEEP

Tomatoes: Like to dry down before being watered again. When blossoming begins, keep soil moisture a little bit drier. Imbalances of moisture may lead to blossom end rot and fruit cracking.

 DEEP

Turnips: Roots will become tough as a result of the development of extra xylem cells if always forced to bring water up from a deep soil level.

 MEDIUM