

Does crop type make a difference?

Each crop type may have a different rooting depth and availability coefficient. The combination of these two factors will effect the irrigation interval.

The previous example was an alfalfa crop. What if it was a grass or pasture crop?

For a grass crop on a sandy loam soil:

$$\text{Total AWSC} = 1.5 \times 1.5 = 2.25 \text{ inch}$$

$$\text{MSWD} = 0.5 \times 2.25 = 1.13 \text{ inch}$$

For an grass crop on a sandy loam soil in

Smithers:

$$\text{Max II} = 1.13 / 0.16 = 7 \text{ days}$$

Where as for alfalfa:

$$\text{Max II} = 18 \text{ days}$$



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BRITISH COLUMBIA
MINISTRY OF AGRICULTURE

Farm Irrigation Systems

Crop, Soil and Climate

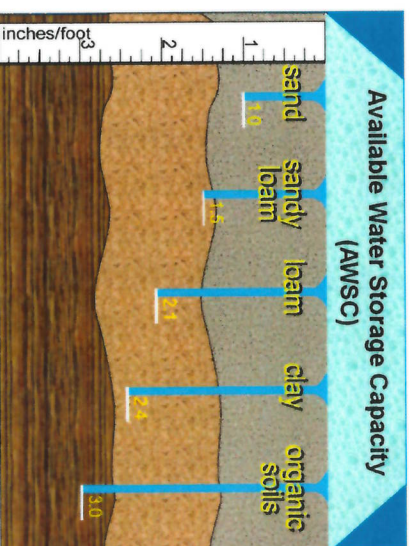


Can you answer these question?

1. Why do we Irrigate?
2. How much water can be applied at one time?
3. How often do we irrigate?
4. Does crop type make a difference?

Why do we irrigate?

Irrigation replenishes soil moisture. The soil is our storage tank for water. The amount of water held in the soil is called the available water storage capacity (AWSC). Each soil type holds a different amount of water.



Each crop type also affects the amount of water that can be stored in the soil. The rooting depth (RD) of the crop is used to determine the Total AWSC.

$$\text{Total AWSC} = \text{RD} \times \text{AWSC}$$

Effective Rooting Depth of Mature Crops			
Shallow 0.45 m (1.5 ft)	Medium Shallow 0.6 m (2 ft)	Medium Deep 0.9 m (3 ft)	Deep 1.2 m (4 ft)
Cabbages Cauliflowers Cucumbers Lettuce Onions Radishes Turnips Grass species Pasture	Beans Beets Blueberries Broccoli Carrots Celery Peas Potatoes Spinach Strawberries Tomatoes	Brussels Sprouts Cereal Clover (red) Corn (sweet) Eggplant Kiwi fruit Peppers Squash Saskatoon	Alfalfa Asparagus Blackberries Corn (field) Grapes Loganberries Raspberries Sugar beets Tree Fruits (12' x 18')
			Tree Fruits (3' x 10')

Example

For an alfalfa crop on a sandy loam soil:

$$\text{Total AWSC} = 4 \times 1.5 = 6.0 \text{ inch}$$

How much water can be applied at one time?

Not all the water in the soil can be consumed by the plant. The availability coefficient (AC) is the maximum percentage of stored water the crop can consume. The maximum soil water deficit (MSWD) is the amount of water that is readily available to the crop.

$$\text{MSWD} = \text{AC} \times \text{Total AWSC}$$

This is the maximum amount of water that should be applied during irrigation.

Availability Coefficients	
Crop	Maximum Percent [% expressed as decimal]
Peas	0.35
Potatoes	0.35
Tree Fruits	0.4
Grapes	0.4
Tomatoes	0.4
Others	0.5

Example

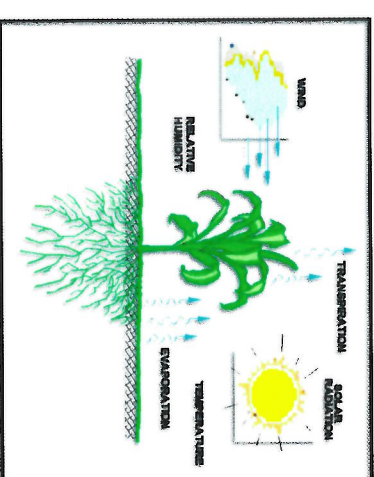
For an alfalfa crop on a sandy loam soil:

$$\text{MSWD} = 0.5 \times 6.0 = 3.0 \text{ inch}$$



How often do we irrigate?

The maximum soil water deficit is consumed by the crop as it grows. This consumption is determined by the evapotranspiration (ET) for a geographical area. The picture below shows the climatic factors that are used to calculate ET.



Most areas of the province have had Peak ET numbers calculated for them. These numbers are used for designing irrigation systems.

Examples

Hazelton	=	0.19 in/day
Smithers	=	0.16 in/day
Terrace	=	0.30 in/day
Vanderhoof	=	0.20 in/day

The maximum irrigation interval (Max II) is determined from the maximum soil water deficit and the evapotranspiration.

$$\text{Max II} = \text{MSWD} / \text{ET}$$

Example

For an alfalfa crop on a sandy loam soil in Smithers:

$$\text{Max II} = 3.0 / 0.16 = 18 \text{ days}$$