

IRRIGATION SCHEDULING FROM EVAPORATION REPORTS

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Temperature, sunlight, wind, and humidity control the rate at which plants use water. They also determine the rate at which water evaporates from a free water surface.

If the relationship between evaporation and plant use is known, the rate of evaporation can be used to determine when to irrigate and how much water to apply. This will prevent over-irrigation which raises the water table and leaches plant nutrients from the soil.

The relationship between evaporation and plant use of water has been established for alfalfa, apples with cover, beans, corn, grain, grapes, pasture, peaches with and without cover, potatoes, and sugar beets. Research work on other crops is continuing at Washington State University Research and Extension Centers.

You can use this method to schedule irrigations if daily reports from an evaporation station are available in your area through newspapers or radio. These reports will give daily and accumulated evaporation.

To use the scheduling board determine the amount of water to be applied at each irrigation and the equivalent amount of evaporation.

For example, suppose you are growing alfalfa and have determined that 6.0 inches of water will be applied at each irrigation and that the equivalent amount of evaporation is 6.3 inches. This means 6.3 inches can be evaporated between irrigations and 6.0 inches should be replaced in the soil.

If the accumulated evaporation on the day of irrigation is 16.3 inches, 16.3 inches plus 6.3 inches or a total of 22.6 inches will be the accumulated amount of evaporation before the next irrigation. Mark both points on the schedul-

ing board and date the 16.3-inch mark. Some growers use a 1:1 ratio for all crops. This simplifies the procedure, but can cause overirrigation.

Daily and accumulative evaporation can be marked on the scale; or put a rubber band around the board and slide it up to the accumulative evaporation reading. Rains under 0.5 inches can usually be ignored in irrigation scheduling. To account for heavier rains, move the mark for the next irrigation up the scale the amount of the rainfall.

Irrigation scheduling from evaporation reports can be started at any time during the irrigation season for perennial crops. With annual crops, this method is usually started when the foliage nearly covers the ground. It can be started earlier, but some over-irrigation will usually result.

Setting Up the Board for Surface Irrigation

EXAMPLE

1. Write the name of the crop and the field designation at the top of one of the columns on the irrigation scheduling board.
2. Find out the water-holding capacity of your soil—in inches of water per foot of soil depth. Your county agent or SCS technician can help you get this figure. If you have variable soil conditions, choose the soil area which has influenced your irrigation practices in the past.
3. See Table 1 to determine rooting depth of mature crop or use lesser depth if soil depth is limited.
4. Multiply the water-holding capacity of soil in inches per foot of soil depth times the depth of the roots. This is known as available moisture. Note precautions on the back page.
5. Multiply this result by 50 per cent for all crops except potatoes. This is the safe amount of moisture that can be removed from the soil. The amount of moisture that can be safely removed for potatoes appears to be only 20 to 30 per cent. Multiply by a figure within this range. Enter the result under *usable moisture* on the scheduling board.
6. See Figure 1 to determine the equivalent amount of evaporation that can occur while this amount of moisture is being used. Enter this figure as *usable evaporation*.

alfalfa

*2 inches
per foot*

6 feet

12 inches

6.0 inches

6.3 inches

Setting Up the Board for Sprinkler Irrigation

EXAMPLE

1. Write the name of the crop and the field designation at the top of one of the columns on the irrigation scheduling board.
2. Determine sprinkler head ratings in gallons per minute. If you do not know the ratings, see your dealer, county agent, or SCS technician.
3. See Table 2 to determine how much water is being applied per hour at the spacing for the sprinkler system.
4. Multiply acre inches applied per hour times the number of hours per irrigation. Enter this figure as *usable moisture* on the scheduling board. Note precautions on the back page.
5. See Figure 1 to determine the equivalent amount of evaporation that can occur while this amount of moisture is being used. Enter this figure as *usable evaporation*.

sugar beets

*6 gallons
per minute*

*.17 inches
at 40' x 60'*

*4.08 inches
for 24 hours*

4.29 inches

PRECAUTIONS

When plants appear to need water before the scheduling board indicates they do, consider the following: 1) The water-holding capacity of the soil may be less than the sprinkler system is designed to deliver. 2) The plant roots may be too shallow or sparse to use all the water that is being applied. 3) Application efficiency may not be as high as anticipated. The sprinkler system may not be delivering the amount anticipated or present surface irrigation methods are not completely wetting the soil. 4) Water distribution may not be uniform. 5) Plants require a higher moisture level.

When the scheduling board indicates an irrigation before plants appear to need it, perhaps soil water-holding capacity is greater than anticipated or water is moving in from other sources.

For those crops having their foliage removed from time to time, such as alfalfa or pasture, there will be a few days following the removal of the foliage when water use by plants will not be as rapid as evaporation records indicate.

TABLE 1—Estimated Normal Effective Rooting Depth

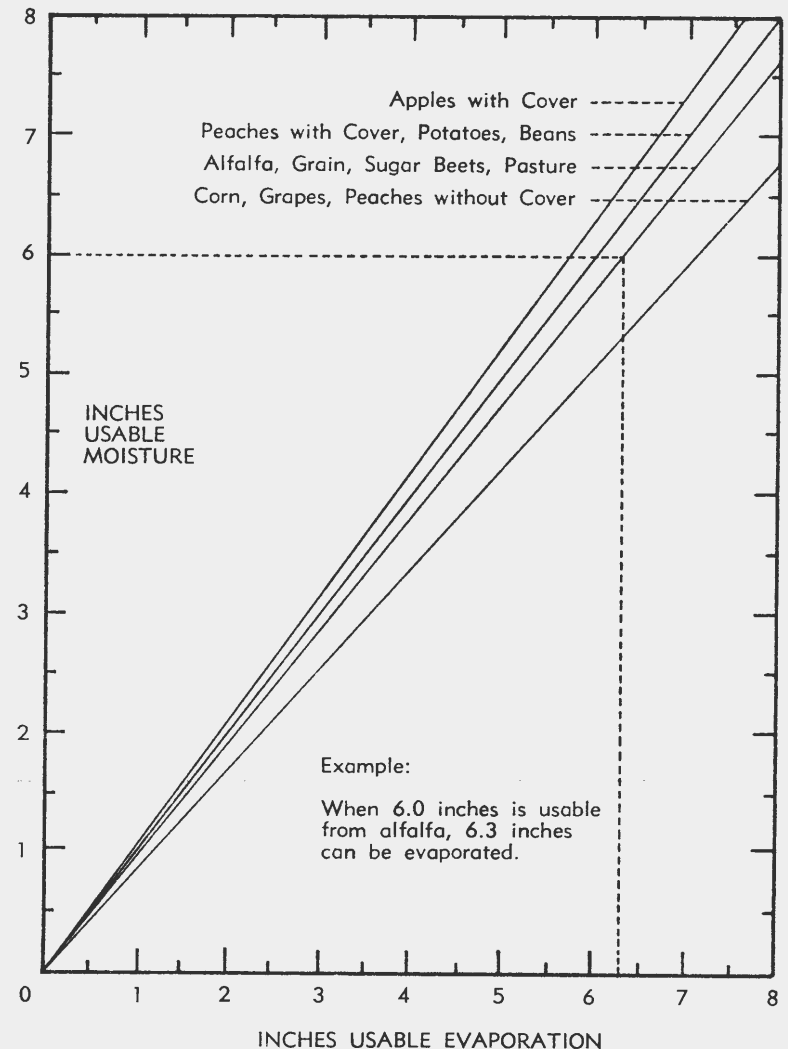
Alfalfa—6 feet	Grapes—5 feet	Potatoes—2 feet
Beans—2 feet	Orchard—6 feet	Small Grain—3 feet
Corn—3 feet	Pasture—2 feet	Sugar Beets—3 feet

TABLE 2—Determining How Much Water Is Being Applied

Inches applied are based on a 70 per cent application efficiency.

SPRINKLER AND LATERAL SPACINGS	SPRINKLER DISCHARGE				
	4 gallons per minute	5 gallons per minute	6 gallons per minute	8 gallons per minute	10 gallons per minute
feet	acre inches applied per hour				
20 x 20	.67	.84	1.00	1.35	1.70
20 x 40	.34	.42	.50	.67	.84
40 x 40	.17	.21	.25	.33	.42
40 x 50	.13	.17	.20	.27	.34
40 x 60	.11	.14	.17	.22	.28

FIGURE 1—Determining Usable Evaporation

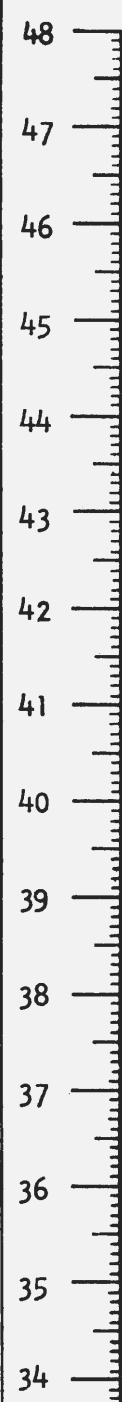
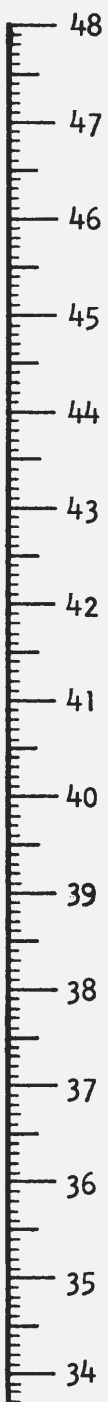


IRRIGATION SCHEDULING BOARD

AND RECORD

Year _____

Crop and Field						
Usable Moisture						
Usable Evapor.						



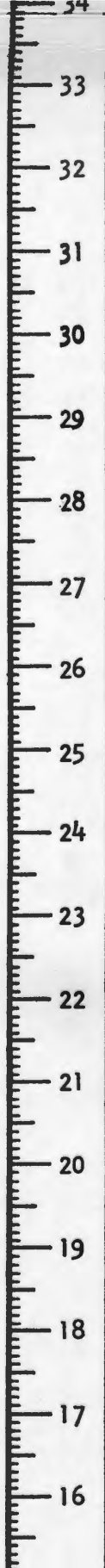
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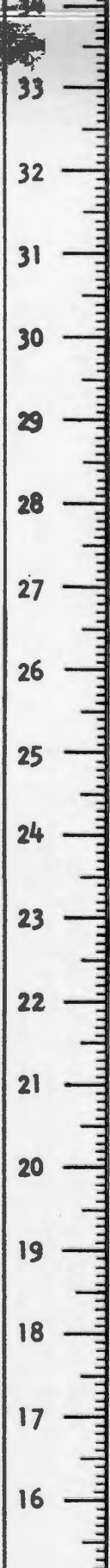
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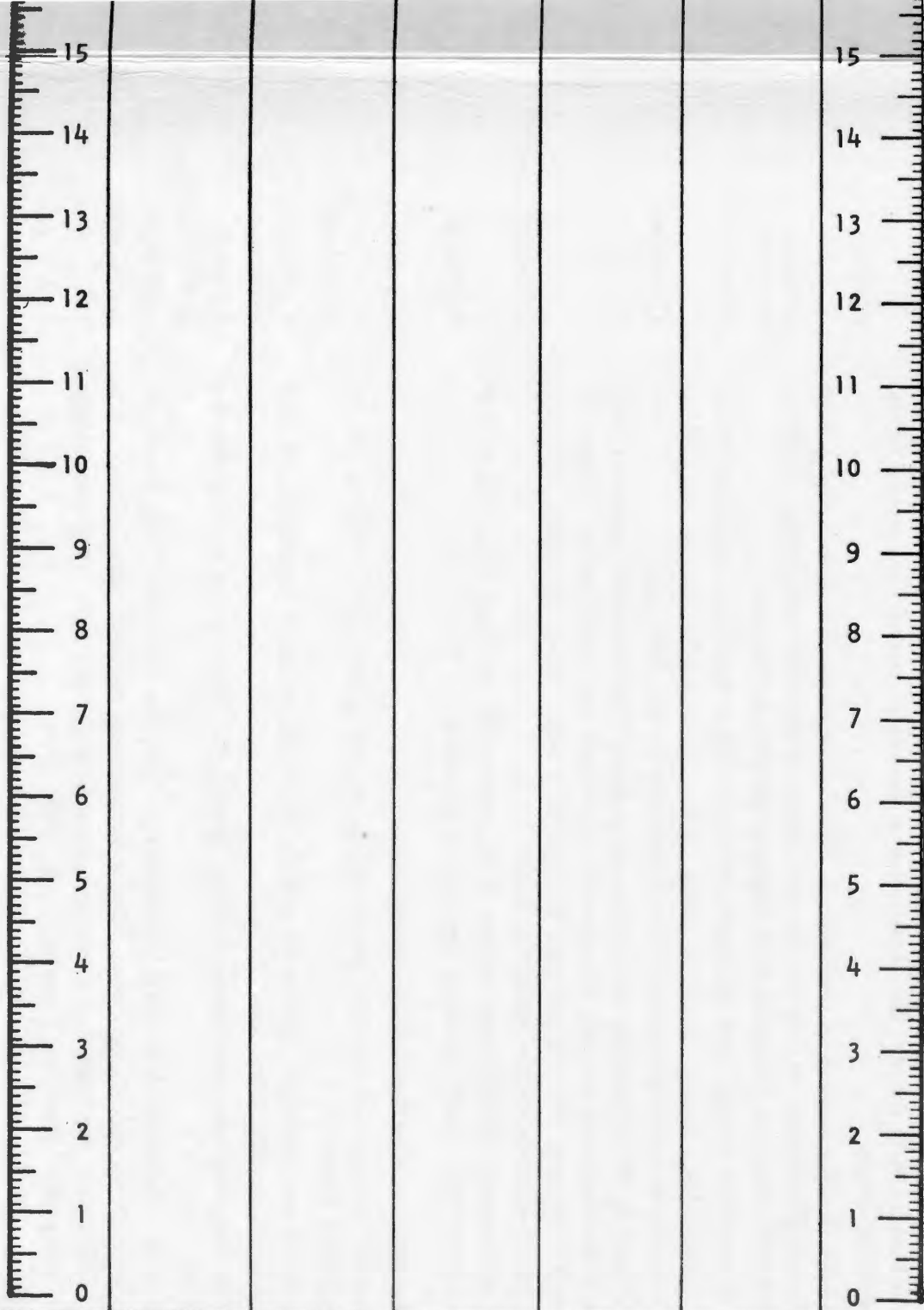


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Legend:

| ——— | Total evaporation until next scheduled irrigation

| — 6/4 — | Total evaporation on day irrigated and date

| — H 8/5 — | Total evaporation on day harvested and date