Irrigation Water Management Practice Calculations

1. You have 5/32" nozzles on a wheel line that operate at 50 psi. This results in a flow rate of 5 gpm. The wheel line is 70% efficient. The sprinklers are 40 ft. apart, and the distance between risers is 60 ft. The alfalfa field you are irrigating consumes 0.28 inches of water on a hot day in July.

   Additional information from web soil survey:

   Soil management (rooting) depth = 18 inches
   Soil available water capacity (AWC) = 0.12 in/in

   a. **What is the sprinkler application rate?**

   b. **What is the maximum irrigation return interval?**

First we calculate the available water content:

The maximum allowable depletion (MAD) is 50%, so the amount of water available to plants is:

From Agrimet, we know that the ET rate is 0.3 in/day. So the number of days to reach MAD are:

   c. **What is the required net irrigation application?**

   d. **Since the system is only 70% efficient, what will the gross application rate need to be to meet this irrigation requirement?**

e. **What would be an appropriate set time for this field?**

2. **If you wanted to replace your wheel line with a pivot, and the area of the field is 150 acres, what (approximate) flow rate might you expect to use for the pivot?**

   (Hint: to convert from in/day to gpm/acre, use a conversion factor of 10/0.53)

First we calculate the gpm/acre required to meet an ET rate of 0.28 in/day:

We can assume a new pivot would be 85% efficient, so the required application rate would be:

Then we convert that to a flow rate, gpm: