

## Practical Project. Principles of Agronomy . 2016/17 (revised May 2017)

We will work in groups of 2 students. Each one will have a different crop and the 2 crops will make the crop rotation. Only one report will be presented by each group.

Weather station.....

Year 2016

Crop species .....

Soil depth 1 m

Soil analysis (0-30 cm): Texture sandy loam

Bulk density 1.4 t/m<sup>3</sup>

Olsen P: 16 mg/kg

Acetate extractable K: 250 mg K/kg soil

Organic matter concentration: 1%

Irrigation by sprinklers with 12 x 12 m spacing, discharge rate 0.3 L/s and application efficiency 0.85.

Irrigation water has CE= 1.5 dS/m and is taken from a small dam using a pump with diesel engine

1- Download the available weather data from the link shown in moodle. Take only complete years starting with 2016 and going backwards.

Calculate mean monthly values of

Maximum temperature

Minimum temperature

Solar radiation

Vapor pressure deficit

Total rainfall

Number of rainy days (consider only days with 0.5 mm or more rainfall)

Wind speed

2- Calculate also for each month:

Daylength

Maximum solar radiation (clear sky conditions)

Net radiation over grass

ET<sub>0</sub> using the Penman-Monteith-FAO equation

ET<sub>0</sub> using the Hargreaves equation

Effective rainfall (Bureau of Reclamation method) (use monthly totals of rainfall)

3- Productivity. Calculate for 2016 and the 2 crops:

- a) Thermal time from sowing to harvest. Assume that crop duration is equal to that defined by the four stages of the FAO method of K<sub>c</sub>.
- b) Intercepted PAR: the fraction of intercepted PAR is calculated for each stage using  
Stage A: f=0.1  
Stages C and D: f=K<sub>c</sub> -0.3  
Stage B: Interpolate between the values of stages A and C
- c) Potential yield. Compare this value with typical yields for this crop in this region.

4- Fertilizer program. Calculate:

- a) Average fertilizer requirements of P and K for the crop rotation. All crops residues are left in the field. Assume that the average yield of your crop is 80% of the value calculated in 3c.
- b) Calculate the N fertilizer requirements for the 2 crops.
- c) Calculate the total cost of the fertilizer program (not including the application cost).

#### 5- Irrigation Schedule

Calculate the irrigation programs for the 2 crops (dates and amounts) in 2016. Assume that the soil water deficit is zero at sowing.

6- Salinity: calculate the amount of irrigation that should be added to that calculated in step 6, to obtain maximum yield.

7- Sowing: Calculate the seed rates for the two crops.

8- Frost: Calculate the probability of frost after March 1.

9- Crop calendar and energy requirements. For the 2 crops establish the crop calendar. Choose a soil conservation system (tillage or no tillage) and indicate dates and operations to be performed (sowing, tillage, application of herbicides, harvest). Calculate the energy requirements of your farm with the current rotation.