Lab -7 Soil and water Conservation / Practical

3th stage Soil and water Dep.

**Cover management factor C- factor:**

Is the ratio of soil loss from an actual plot to that from a standard plot .this two plots are identical in all aspects except that the standard plot is keep clean tilled continuous follow .(C- factor) range between (0 - 1).

Standard clean tilled continuous follow

As

Actual

Aa

C=

SLR= soil loss ratio = C-factor

**SLR=PLU. CC. SC. SR. SM**

PLU= The prior land use subfactor

CC= Canopy cover subfactor

SC = Surface cover subfactor

SR= Surface roughness subfactor

SM= Soil moisture subfactor

**1. The prior land use subfactor (PLU ):**

The prior land use subfactor express:

1.the influence on soil erosion subsurface residual effects from previous crops.

2.The effect of previous tillage practices on soil consolidation.

**PLU= Cf Cb exp[( - Cur Bur ) + ( Cus Bus / Cf cuf )]**

Cf = is a surface soil consolidation factor. it express the effect of tillage induced surface density changes on soil consolidation .The Cf  value for soil freshly tilled conditions is 1.0 .if the soil left undisturbed this value decays exponential to 0.45 over 7 years(PLU = e – 0. 1141t)

Cb = surface soil consolidation factor (0.951)

Bur = mass density of live and dead roots found in the upper inch of soil (lb acre-1 in -1).

Bus = mass density of incorporated surface residue in the upper inch of soil (lb acre-1 in -1).

The coefficient ( Cb , Cur , Cus and cuf ) describes the relative effectiveness of sub surface biomass in reducing erosion .from analysis

Cb =0.951 , Cur = 0.00199 acre inch lb-1 ,

Cus = 0.000416 acre inch lb-1

And cuf = 0.5

**2.Canopy cover subfactor CC:**

Its expressed the effectiveness of vegetative canopy in reducing the energy of rainfall striking the soil surface it is given by:

**CC= 1- Fc. exp(- 0.1 H)**

Fc =fraction of land surface covered by canopy

H = high of canopy in foot (ft).

**3.Surface cover subfactor(SC):**

This factor effectives erosion by:

1.reducing the transport capacity of runoff water.

2. causing deposition in ponded area.

3. decreasing the surface area susceptible to rain drop impact.

This factor is given by:

**SC= exp[ - b. Sp ()0.08 ]**

SC = Surface cover subfactor

b= coefficient (0.035)

Ru= surface roughness (inch)

Sp = percentage of area covered by surface cover

**Sp = [1- exp(- α Bs)]\* 100**

α = is the ratio of area covered by a piece of residue to the mass of that residue (pond.acer -1).

Bs = the dry weight of crop residue on the surface (acer.pond-1).

**4.Surface roughness subfactor (SR):**

**SR= exp[- 0.66(Ru – 0.24)]**

Ru= surface roughness before the current tillage operation.

**Ru= 0.24 + Dr(Ri – 0.24)**

Ri= the initial roughness in **inches**

Dr= the dimensionless roughness decay coefficient

**Dr = exp[- 0.07 Pt – 0.006 EI]**

Pt = the total **inches** of rainfall since the most recent operation.

EI = is the rainfall energy since that same operation. range (1.0 – 0.0)

**Ri =[0.24 +(Rn – 0.24)] / De**

**Rn= Ra Fd + Ru Fu**

**Ra= 0.24 +(Rt – 0.24) {0.8[1-exp(- 0.0012 Bu)] + 0.2}**

Bu= surface biomass in the top inch of soil (lb acre-1 in -1).

Rt= the original tillage roughness

Rn= the net roughness

**Fd** and **Fu** are fraction of disturbed and undisturbed

**5.Soil moisture subfactor (SM):**

Antecedent soil moisture has substance affection infiltration and runoff .

SM for soil profile at or near field capacity = 1.0

SM for the profile near wilting point to a 6 foot depth = zero