# SALEACH: A New Web-based Soil Salinity Leaching Model for Improved Irrigation Management

Hossein Shahrokhnia Laosheng Wu

Department of Environmental Sciences, University of California, Riverside, CA 92521, USA

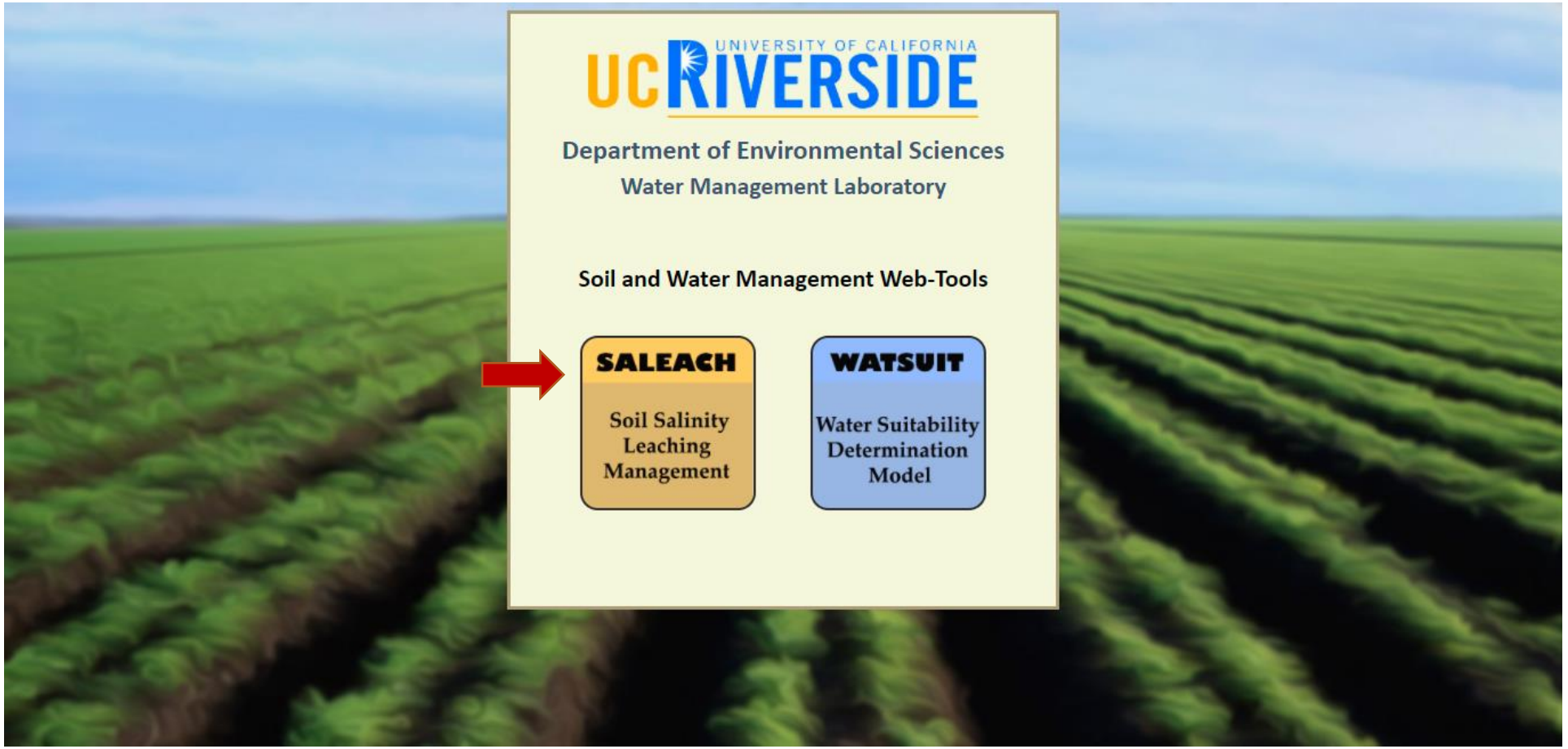
# Introduction

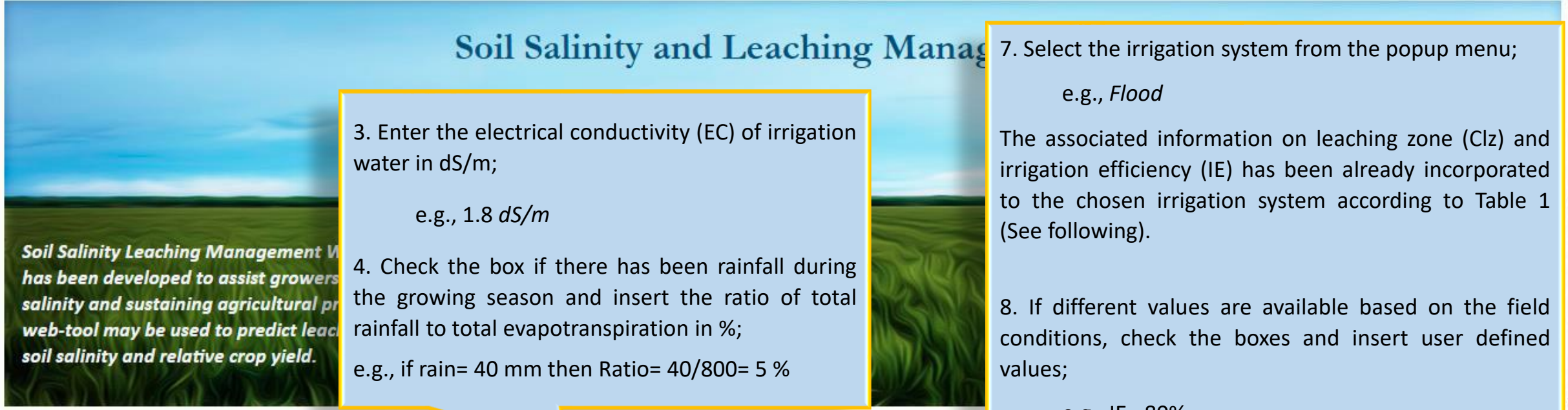
- The Soil Salinity Leaching Management Web-tool (SALEACH) is a free online tool to assist growers and farm water managers for better and easier management of soil salinity in irrigated croplands. The web-tool has been developed with the purpose of using minimum information of soil, crop, water quality, and irrigation system to estimate leaching requirement and corresponding soil salinity.

- SALEACH employs the traditional steady-state model to estimate leaching requirement (LR) by considering differences in crop types, irrigation systems and soil types. Specifically, the parameters in the proposed approach for LR estimation include crop tolerances to salinity ($EC_t$) and water stress, salinity of irrigation water ($EC_{iw}$), rainfall, root water uptake pattern, and leaching zone factor ($C_{lz}$).

- SALEACH can calculate the required water application using the LR or any specified leaching fraction (LF) by users, predict the drainage water salinity and soil salinity in the root zone based on the applied leaching fractions, and estimate relative crop yield for a given LF. Comparison of SALEACH with other sophisticated models such as HYDRUS-1D and WATSUIT indicates the new tool can provide good estimation of leaching requirements and soil salinity for practical uses in irrigated croplands.

# salinity.ucr.edu






3. Enter the electrical conductivity (EC) of irrigation water in dS/m;

e.g., 1.8 *dS/m*

4. Check the box if there has been rainfall during the growing season and insert the ratio of total rainfall to total evapotranspiration in %;

e.g., if rain= 40 mm then Ratio= 40/800= 5 %

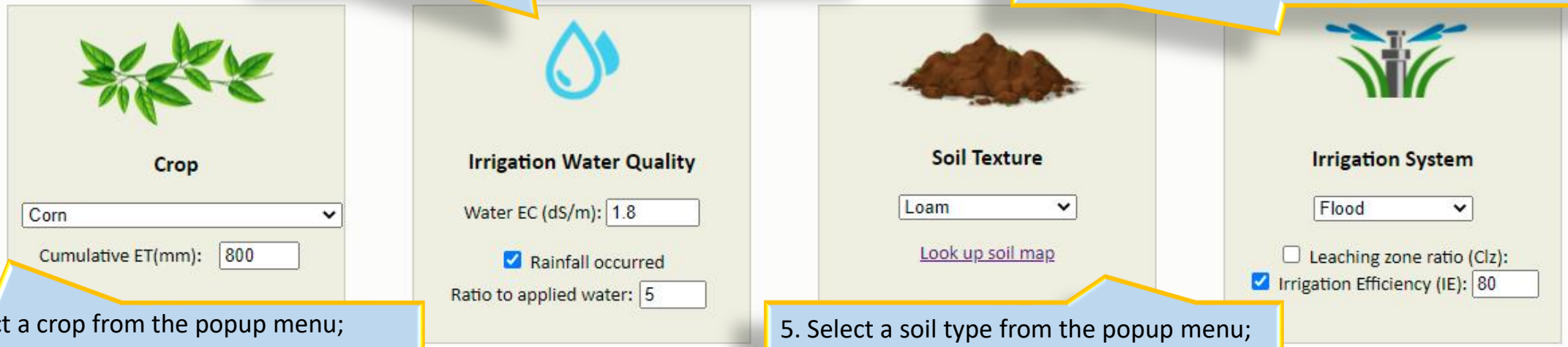
7. Select the irrigation system from the popup menu;

e.g., *Flood*

The associated information on leaching zone (Clz) and irrigation efficiency (IE) has been already incorporated to the chosen irrigation system according to Table 1 (See following).

8. If different values are available based on the field conditions, check the boxes and insert user defined values;

e.g., IE= 80%




1. Select a crop from the popup menu;

e.g., Corn

2. Enter the total crop evapotranspiration in a growing season in millimeter (mm);

e.g., 800 mm

5. Select a soil type from the popup menu;

e.g. *Loam*

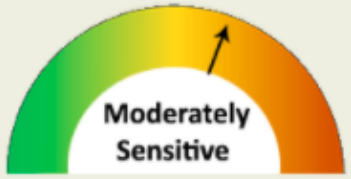
6. If it is not known, the soil type information can be found via the interactive map from USDA-NCSS soil survey data by clicking the link.

Next slide

## Leaching Requirement (LR)

Calculate !

**Crop Tolerance to Salinity:**



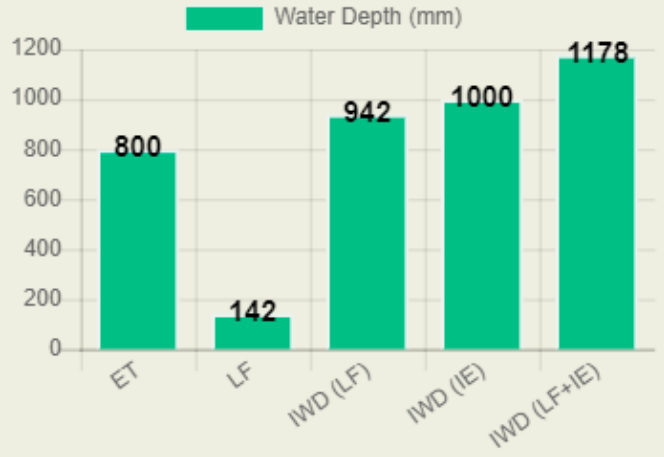

**SALEACH LR:**

15%

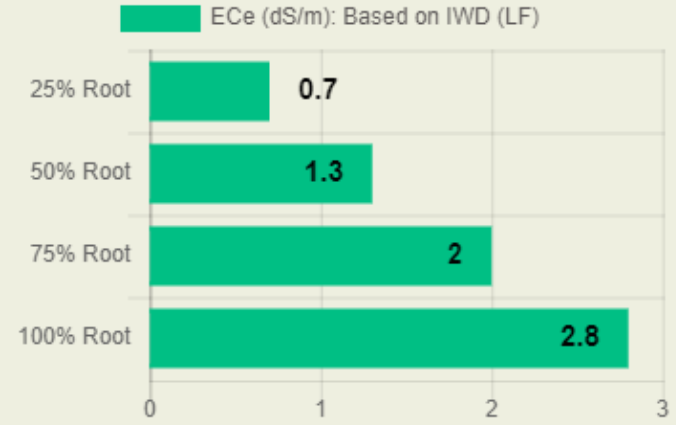
**Traditional LR (Rhoades, 1974):**

25%

## Irrigation Water Depth (IWD)




## Soil Salinity (ECe)




RootZone ECe= 1.7 || Drainage Water EC=11.3 (dS/m)

Once completing the input information, click on the ***Calculate*** button to show the results.

***Crop tolerance to salinity:*** Depending on the crop type, it can be sensitive, tolerant, moderately sensitive or moderately tolerant.

***SALEACH LR:*** The calculated leaching requirement by considering all the factors of soil type, irrigation system, and crop type.

***Traditional LR:*** The calculated leaching requirement based on the traditional approach of Rhoades (1974).

***ET:*** The total crop evapotranspiration during the growing season (mm).

***LF:*** The net leaching water depth (mm) calculated based on the "SALEACH LR".

***IWD (LF):*** The calculated irrigation water depth based on the evapotranspiration and leaching fraction (no irrigation efficiency included).

***IWD (IE):*** The calculated irrigation water depth based on the evapotranspiration and irrigation efficiency (no leaching fraction included).

***IWD (LF+IE):*** The calculated irrigation water depth based on the evapotranspiration, leaching requirement and irrigation efficiency.

The predicted soil salinity (EC of saturation extract) at each quarter of the root zone after applying the "SALEACH LR".

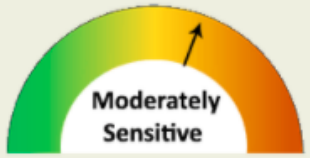
The drainage water EC is the EC of soil water draining below the root zone

Next slide

## Leaching Requirement (LR)

Calculate !

**Crop Tolerance to Salinity:**



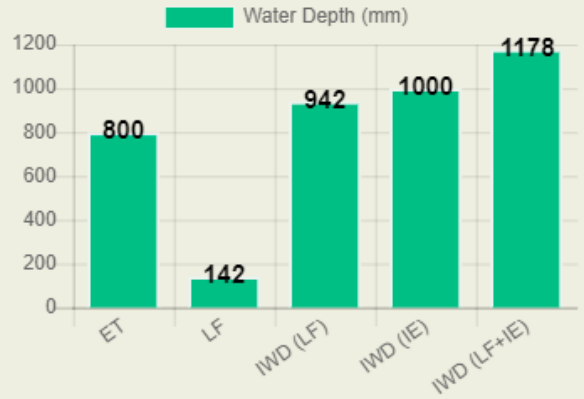

**SALEACH LR:**

15%

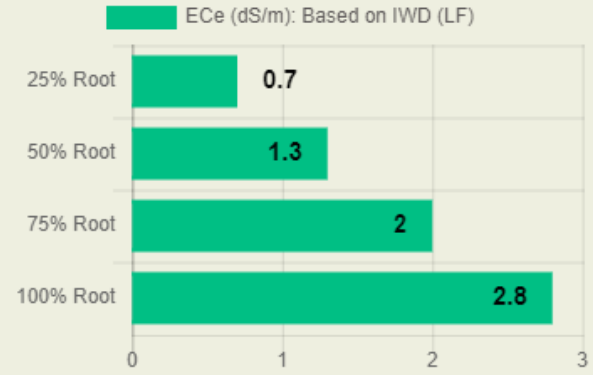
**Traditional LR (Rhoades, 1974):**

25%

## Irrigation Water Depth (IWD)




## Soil Salinity (ECe)




RootZone ECe= 1.7 || Drainage Water EC=11.3 (dS/m)

## Relative Yield

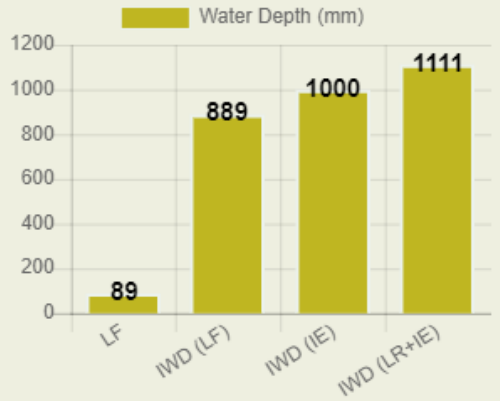
**Your Preferred Leaching Fraction (LF%):**

10 Calculate !

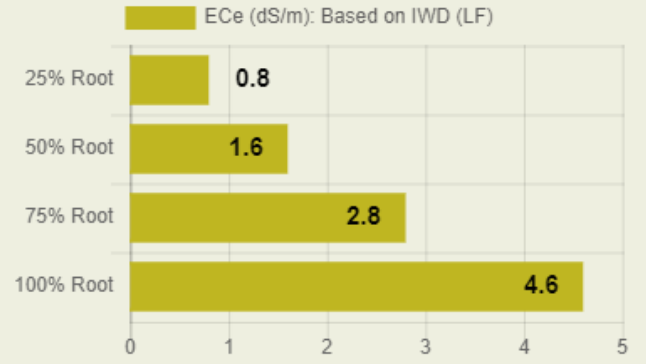
**Relative Yield:**

91%

## Irrigation Water Depth (IWD)




## Soil Salinity (ECe)




RootZone ECe= 2.5 dS/m

If a user likes to apply a lower LF than the "SALEACH LR", the relative crop yield will be calculated based on the user-defined leaching fraction (LF).

e.g., for LR=15% then relative yield=100%; for LF=10% then relative yield= 91%

The irrigation water depth and soil salinity will be calculated based on the new user-defined LF.