Drought stress and irrigation

Run a model that simulates drought stress, find optimal irrigation strategy to compensate drought stress

Options:

Water\_stress-> pot, root->initial water content (Vol%)

(LINCOLN) Soil water\_lintul 2-> pot, root depth->drainage rate per day, soil depth, initial water cotent (Vol%)

(CKA) Soil water lintul 2-> pot, root depth-> drainage rate per day, soil depth, initial water cotent (Vol%)

(LINCOLN) Soil water\_slim->

(CKA) Soil water Slim->

(CKA) Soilwater Hillflow->

(CKA) Soilwater Hillflow->

Questions:

How to access the info (what values were used, equations, context) in SIMPLACE?

What do you want to see in the ppt and project?

-documentation of runs

-analysis of runs

-recommendations (irrigation strategy)

Parameters to change:

Crop

Initial water content (Vol%)

Seasons of interest? (dry season)

Factors for irrigation scheduling:

soil texture • soil structure/water penetration • depth of effective root zone of the soil • the crop grown • the stage of development of the crop

References:

[**https://doi.org/10.1002/agg2.20351**-](https://doi.org/10.1002/agg2.20351-) Impact of drought stress on spring wheat grain yield and quality

DOI:[10.5897/AJB11.352](http://dx.doi.org/10.5897/AJB11.352" \t "_blank) Effects of drought stress condition on the yield of spring wheat (Triticum aestivum) lines

Consultation

SIMPLACE\_WORK\_> sim-> water\_stress-> soln project data (copy the zip, with original names)

Download the folder in zip file.

Should extract, paste in soln, to add water stress, no water stress

Water stress, Water stress yearly, no water stress

No watertress-> optimum (biomass) for 10 years. Achievable. -> best case scenario

Analysis> use the csv files

Find: simplace Work-> folder output

-run just once

Water stress soln->

Values are not for real-life application, just for exercise

Just 2 irrigation dates

No change in the schedules-> worst case scenario

1\_0 1\_0-> versions of the files (OUTPUT folder) (day 1\_0, day 1\_0)

Using max water-> same as the no stress

See yearly biomass-> access the yearly biomass csv, sum (no tress-8398)

Full irrigated yearly biomass-> (8393)

200mm water/year

Find combinations, same results. Can say we only want 95% of yield… can calculate 90% of 8300..

Combination below 80% (not use)

Make many runs-> least water

Daily output-> how to model water and water stress

Indicator of water stress-> Tranrf

tranRF= 1 (no water stress)

biomass of storage organs

If we want yearly yield to be at 90%

60% yield-> famine. Even if 1 year, it’s not sufficient

Need more water or put in other days

How is water in soil? Volumetric water content

Root depth

May take time before the water reaches the roots (superimpose the root depth and volumetric water content)

Cntrl+shift -> overlay graphs

4 parameters

1 drawback-> cannot control per year (waste water too much)-> not realistic

Recommendation-> include uniqueness per year (setting per year, not fixed)-> avoiding wasted water)

Best irrigation scheduling (visit the science, add recommendations)

3rd solution-> after you found minimum water, best schedule

So many combinations

Find good strategy-> why was it used? Back by irrigation science

Set thresholds (90%?)

**Bonus task:**

Water yearly soln

Irrigation csv

Can do individual adjustments in this csv per year

(targeted irrigation)-> look at weather forecast, field, drought?

Monitor more, more effort.

Can you save more water with targeted irrigation?

Conclusion: it’s better or not… savings in terms of water

Pros and cons (in terms of what?)

Depends on location

Pot growth, standard irrigation regime, individual

Lots of runs, best results, explain the strategies, with what values, show graphs,