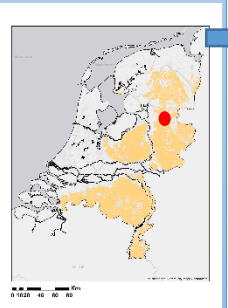
Controlled drainage with subirrigation – field pilot Stegeren (NL)

J.A. (Janine) de Wit[1,2], R.P. (Ruud) Bartholomeus[1,2], M.H.J. (Marjolein) van Huijgevoort[1], and G.A.P.H. (Gé) van den Eertwegh[3]

[1]KWR Water Research Institute, Nieuwegein, the Netherlands (janine.de.wit@kwrwater), [2]Wageningen University, Soil Physics and Land Management Group, Wageningen, the Netherlands, [3]KnowH2O, Berg en Dal, the Netherlands

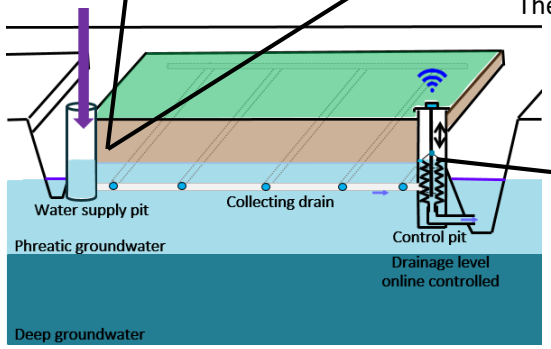
Introduction

- *Over the last decades:* desiccation occurs as a result of measures to live in a delta (drainage systems, land consolidation and urbanization)
- *Nowadays*: a large pressure on the groundwater system + more frequent weather extremes (dry periods and heavy rainfall)



Location Stegeren

Supply pump on solar energy (left + middle), measurement equipment (right)



The weir crest (in the control pit)

Goal

Improving conditions for crops through regulating the groundwater level using controlled drainage with subirrigation system.

Methods

Field pilot (2018 – 2021) using controlled drainage with subirrigation remotely (CAD) in Stegeren (NL).

Step 1: Calibration SWAP-model with field measurements

Step 2: Forecast the soil moisture conditions with SWAP with the actual weather forecast

Step 3: Optimalisation crest level using TMX telemetry

1. Oxygen stress: lower CAD level→ discharge water
2. Prevent drought stress: raise CAD level → retain water
3. Optimal conditions: CAD level remains → no action

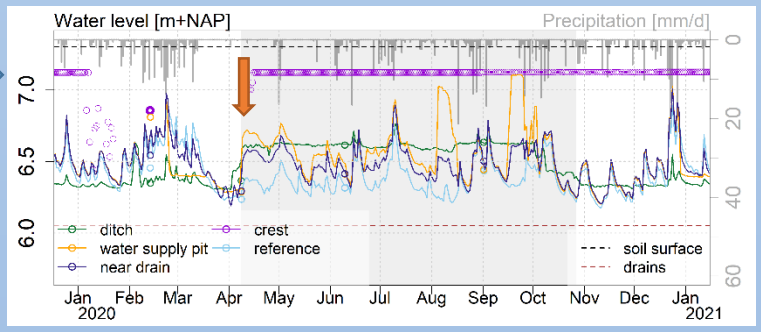
Conclusions

- Growing conditions can be improved through anticipative management of the crest level.
- Effective crop water supply depends on local hydrologic conditions.
- Controlled drainage with subirrigation is a measure to: discharge, retain, and recharge water.

Results

Field measurements

- Groundwater level rises when water supply started (arrow).
- Water supply was not enough to rise GWL the whole year.

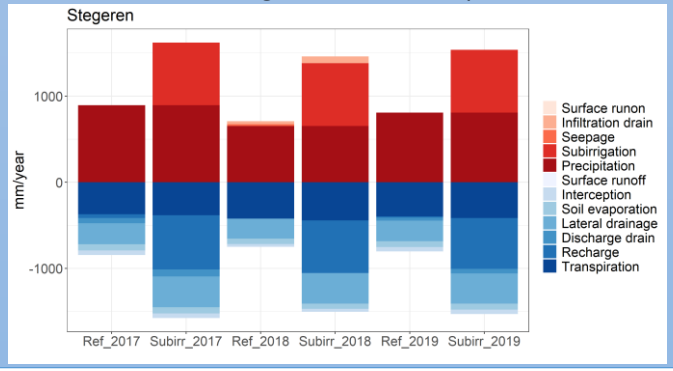


Field modelling (SWAP model)

The water balance changes through water supply:

- Recharge increases (~ 75 % - 80 %)
- Transpiration increases (~ 1.5 % – 2.5 %)
- Drainage increases (~ 15 %)

Note: water balance changes are location specific!



EGU General Assembly 2021 KLIMAP KWR KnowH2O