

# Improving Water Use for Dry Season Agriculture by Marginal and Tenant Farmers in the Eastern Gangetic Plains

## TECHNICAL NOTE

## DSI Scheduler for Irrigation Scheduling



Activity 3.4 in the DSI4MTF project involves the development of interactive tools to support the understanding and knowledge of improved irrigation, water and energy management. Some prototype software tools have also been developed to assist the project staff to capture field data. This Technical Note details the DSI Scheduler tool that can be used for irrigation scheduling and water management record keeping

### Irrigation Scheduling

Plants transpire water from the soil through their roots, stems and leave out to the atmosphere. The rate that this transpiration occurs depends on a number relationships but is driven by the atmospheric demand.

To ensure optimum crop yields it is important to ensure that the plant has enough water (but not too much) to keep up with the atmospheric demand. Irrigation Scheduling ensures that the plant is getting not only the right amount of water but also that it is receiving it at the right time.



Figure 1: Over irrigation of crops is an expensive mistake. Firstly, paying for unnecessary pumping, but also reducing potential yield due to water logging

### DSI Scheduler

The DSI4MTF team have develop a mobile phone software program that calculates the crop water requirement and reports how much water to irrigate on each plot to ensure that the crop does not get water stressed. The DSI Scheduler tool uses the FAO56 Methodology for calculating the crop water use based on the Reference Evapotranspiration ( $ET_0$ ) and crop specific Crop Coefficients ( $K_c$ ). This crop water use can then be used in a daily soil water balance model to show how much water is left in the soil profile and when it needs to be irrigated again.

The tool can also be used to store irrigation and rainfall records and at the end of the season, calculate the water productivity .



Figure 2 :The DSI Irrigation Scheduler is an FAO56 based decision support and data recording tool

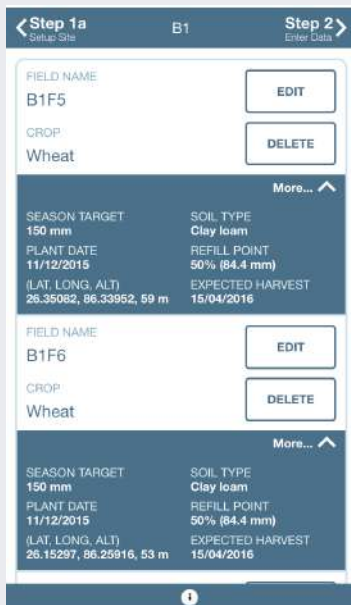


# TECHNICAL NOTE

## DSI Scheduler for Irrigation Scheduling

### Step 1 – Set up fields and crops

The user sets up the tool at the beginning of each season for each crop or plot. This is a simple process and only requires a field name, crop type, soil type and plant and expected harvest date with an estimate of how much irrigation is to be applied. The app calculates the amount of plant available water based simply on the soil texture chosen and holds the long-term average evapotranspiration data for each intervention site which can be overwritten as necessary.

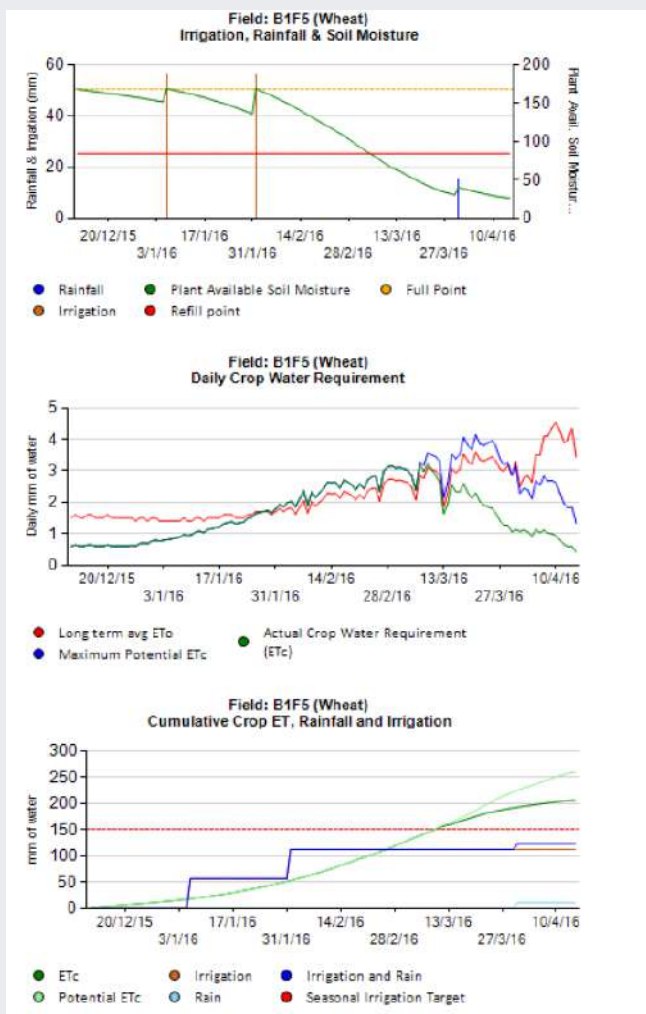


### Step 2 – Enter Rain and Irrigation

Once the tool is set up, the DSI Scheduler displays data just like a calendar, and lets the user enter the rainfall and irrigation (mm) that have been applied on each plot. It can quickly show how much in-season rainfall the crop receives and how much irrigation has been applied to each plot. From here the user can see when the next irrigation is due on a particular field. The quick buttons will give a graphical representation of the data that has been collected and the calculation that have been used to generate the irrigation schedule.



### Step 3 – Producing Reports



The DSI Scheduler can then be used to output some reports for analysis (Detailed Report) or Action (Scheduling report)

The **Scheduling Report** is a simple output that shows the user which field need irrigating and how much to apply to each field to refill the soil profile to field capacity. The **Detailed Report** can be used at any stage of the growing season to see how the crops are performing from a water use perspective.

The detailed report provides a summary table and three graph for each field that is selected and can be exported to a PDF document for easy sharing.

#### Daily Irrigation , Rainfall and Soil Moisture

The first graph shows the calculated soil moisture through to present day (or harvest date). The green trace falls every day that the crop is using water and rises sharply whenever there is a rainfall or irrigation event.

#### Daily Crop Water Requirement

The second graph simply displays the daily crop water use through the season. This graph can show when the crop is water stressed and is not transpiration at the optimum rate.

#### Cumulative Crop ET, Rainfall and Irrigation

The third graph shows the seasonal cumulative totals of crop water use against rainfall and irrigation applied. This lets the user track if water is being applied at the right time to meet crop demand.

**At the end of the season, the Detailed Report can be used to compare the performance and yield of fields and farms against each other or a single field over multiple season through time.**

