

IRRIGATION SCHEDULING: THE FULL STOP WETTING FRONT DETECTOR

Proper irrigation scheduling is simply applying the appropriate amount of water at the correct time. Scheduling considers such physical factors as the water-holding capacity of the soil, crop water use rate, and plant characteristics (e.g. root depth and sensitivity to water stress). Scheduling also involves human factors such as being able to irrigate only on certain days (e.g. even or odd days), labor constraints, water delivery constraints (e.g. canal system infrastructure), and a host of other human considerations.

Two reasons are often given for irrigation scheduling - it saves water and it protects the environment.

The main methods of Irrigation Scheduling are soil-based
plant-based
climate-based

The climate based method, along with its accompanying computer programs or fill-in charts, usually comes to mind when the term "irrigation scheduling" is mentioned. The other two methods are both sensor-based methods, employing sensors that make immediate contact with the plant or soil environment. Because they are a more direct approach to answering the question of when to turn on the water, fewer steps are required for scheduling than with the climate-based approach.

Soil-based scheduling methods rely on sensors that monitor the moisture level in the soil at appropriate locations and depths. As a plant uses water, the root zone soil moisture reservoir is depleted. Many devices are available that can measure the amount of remaining water in the soil. When sensors indicate that the remaining soil moisture level reaches a critically low value, irrigation is applied.

Agriplas produced the first commercial version of such a device which is called The Wetting Front Detector. It is not regarded as a replacement for other scheduling tools, but should be used together with whatever method a farmer is comfortable with.

The device comprises a specially shaped funnel, a filter and a float mechanism.

The funnel is buried in the soil within the root zone of the plants or crop. When the water reaches the buried funnel the flow is focused so that the soil in the funnel gets wetter and wetter as the cross sectional area of the funnel narrows.

The soil at the base of the funnel becomes so wet that water seeps out of it, passes through a filter and is collected in a reservoir. This water activates a light-weight rod, which operates a red indicator flag above the soil surface. There are no wires, electronics or batteries.

Wetting front detectors are usually used in pairs - one buried about one third of the depth in the active root zone and the second at about two thirds of the rooting depth. However, this varies for the type of irrigation system used.

If the shallow detector is rarely activated it is likely that the crop is being under irrigated. If the deep detector is often activated it indicates that the crop may be over irrigated. The ideal is to find the middle ground.

In addition to informing the farmer that the wetting front has reached a certain depth, the detector retains a sample of water that can be extracted via a tube using a syringe and analysed for its salt or nitrate concentration. This is done using a simple field salinity meter or colour nitrate test strip.

The research to fine-tune these methods is still underway and in its early stages.





