ZiMUNDA FARMING

HOT TOPIC

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Wheat Irrigation in Winter 2023

By Langton Mutemeri, Research Manager at Agricultural Research Trust

The best soils for wheat production are deep, heavier textured soils with a good organic status. However, it is possible to grow wheat on a wide variety of soils if they are well-drained. Irrigation management and fertilisation practices must be of a high order to obtain economically viable yields on lighter soils. It is advisable to avoid poorly drained, badly aerated soils as wheat is susceptible to water logging. Wheat roots under ideal conditions can penetrate as deep as 1200 to 1500mm. The soils chosen must be in good health biologically, physically, and mechanically with a pH reading ranging from 5.0-6.0 pH ($CaCl_2$) on sands and 5.3-6.3 on red clay loams and clays.

The farmer must plan to determine water resources, land availability, pipe layouts, and the minimum cycle length required. The method of irrigation scheduling to be used must be decided upon before you plant the wheat. Make sure your irrigation equipment is in good working order and maintain it as such throughout the season. In particular, check for leaks, sprinkler function, and correct nozzle size. It is a clever idea to replace nozzles annually. Keep to design specifications on pressures, spacings, and layout.

Germination irrigation - When applying your germination irrigation, make sure that by the time the wheat emerges, or at the very latest at three weeks, the soil must be at field capacity down to the potential rooting depth, which may be 1.5m on deep soils. This is important because any dry layers in the soil profile will impede root development and crop growth. After the germination irrigation at day, zero apply light irrigation of 22mm between days 4 and 7 to moisten the soil surface to facilitate emergence. The next irrigation is applied about 21 days after the first germination irrigation when the wheat plants start to develop crown roots and tillering. At this stage, light irrigation of no more than 22mm is required to recharge the topsoil.

Irrigation Scheduling After Sowing - After this irrigation, you then stress condition your crop up to day forty after sowing when you apply full irrigation of 44mm on heavy soils and below 30 mm on light-textured soils. At this stage, you then start your irrigation scheduling. Irrigation scheduling is a key component of successful wheat farming and involves the forecasting of water application for optimal crop production. The scheduling method may be complex or simple, but whatever approach is taken it must fit into the farming system and be appropriate to the broad objectives of the farmer. Proper irrigation is necessary for the efficient use of water, and all other necessary inputs. The benefits of proper irrigation scheduling include improved crop yield, water conservation, and low production costs. The use of

an evaporation pan and scheduling graph will assist you in evaluating when to irrigate, and how effective your irrigation is in maintaining the desired soil water balance. In-field checks of the soil water content with an auger throughout the season will also help you evaluate your irrigation regime. Auger ahead of and behind the irrigation line to check if the cycle is due and behind to check the effectiveness of water application.

The Irrigation Cycle - The simplest form of irrigation scheduling is to set the cycle length at the start and maintain that throughout the growing season. On heavy soils, after day forty irrigation maintain a 12 to 14-day cycle applying 44mm, and on light textures, soils maintain a 7 to 9-day cycle applying less than 30mm depth of water. The centre pivot applies less water of about 22 mm with cycle intervals of between 5 – 7 days. Another simple method is to schedule irrigations at particular growth stages, For the highveld these are.

Germination and emergence.
Crown root development and tillering (3-4 weeks).
The appearance of the first node and start of shoot elongation (6-7 weeks).
Booting and flag leaf emergence (9-10 weeks).
Ear emergence and anthesis (flowering at about 12 weeks).
Grain filling from 13-14 weeks.

These growth stages occur earlier in the middle and lowvelds, and the timing may vary depending on the variety grown. If

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a manager kept strictly to irrigating only at these growths, stages it is likely that the plants would undergo some stress, and yields may be adversely affected. Again, this method gives no information on the soil water status.

Simple soil water budgets can be calculated from estimates of potential evaporation and crop factors. Crop factors or Et/Eo represent the ratio of crop water use (Et) to potential evaporation (Eo) and varies through the season with the crop growth stage. For a given day, the crop water use can be calculated by multiplying the daily evaporation with the appropriate crop factor. This daily crop water use can then be cumulated from day to day and irrigation applied when the total crop water use equals the irrigation application of a convenient set time. This method can use either historical or current evaporation data. The problem with these figures is that they are averages of averages and therefore do not allow for extremes when used on a daily basis. Nevertheless, in the absence of current evaporation data, they can help farmers schedule irrigations; and has the advantage that the schedule can be prepared at the start of a growing season.

Example:

Site;	**Kadoma**
Wheat planted	15 May.
Date of observation	10 July
The growth period is	8 weeks after planting.
Eo =	4.5 mm
Et/Eo ratio =	0.8
Water use by plant	4.5 * 0.8 = 3.6 mm/day
Scheme design to apply	44 mm NET.
Period between irrigation =	44/3.6 = 12 days

Therefore, during this period, the interval between irrigations is 12 days. A new figure will have to be calculated between each irrigation and from month to month. As mentioned before, the main drawback of this system is that it does not consider daily variations in weather conditions.

The current Evaporation Data method employs the evaporation data recorded from a Class A pan located in the appropriate situation. Using the Pan Deficit Graph method simplifies the calculations and only requires the daily evaporation to be entered into a specially prepared graph. The daily readings are accumulated until they reach a pre-determined line on the graph which acts as a trigger for irrigation application. These graphs are supplied by the CFU crops division and are specific for three factors; **Crop, Region**-low, middle, or highveld; **Amount** of net irrigation application.

During Grain Fill - At least one irrigation should be applied during the grain-fill period (i.e., after flowering). It is preferable to apply two or more irrigation during grain filling. However, there is no point in applying irrigation once the crop has begun to yellow, and the grains are fully formed and doughy. If the crop is still green, and you have the water, it will pay to irrigate, if there is an evident change in colour of the peduncle from green to yellow stop irrigating. A wheat crop requires 4 to 5 mega litres of water per hectare per season.

It will be helpful for future reference to keep records of how you irrigated your wheat crop, and what the results were like. Aim to do better with each crop. Minimise deep percolation below the root zone on sprinkler-irrigated fields by applying water according to crop evapotranspiration and soil moisture status. Also, minimise surface runoff and increase uniformity on sprinkler-irrigated fields by decreasing application depth or by changing nozzle and pressure configuration, height, or droplet as appropriate. Maintain sufficient residue to reduce overland water flow and increase moisture intake rate. Where practical, follow soil conservation practices such as minimum tillage to reduce soil erosion of soil sediments containing nutrients or pesticides. Test systems periodically for depth of application pressure, and uniformity.

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37 Victoria Drive, Newlands, Harare
Zimbabwe