INTRODUCING THE WEB-BASED VERSION OF KANSCHED: AN ET-BASED IRRIGATION SCHEDULING TOOL

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INTRODUCTION

Irrigation scheduling is a process of determining when and how much water to apply to a crop to meet specific management goals – generally to prevent yield limiting crop water stress. Evapotranspiration (ET) or crop water use information can be used for irrigation scheduling and is often described as being similar to a checkbook accounting procedure except in this case, root zone soil water content, rather than money, is the account balance. Deposits to the account would be effective rainfall and irrigation and withdrawal is the crop water use One notable difference is that the water balance can become too large and the additional deposits would be lost to surface water runoff or deep percolation as well as being too low or deficient for optimal crop growth.

The upper limit of root zone soil water is determined by the soil water holding capacity which for irrigation water management purposes is known as field capacity and the managed crop root zone. The desired lower limit for optimal crop growth can be a more variable value depending on the crop, the stage of growth, and management goal. Often it is referred to as the managed allowable deficit or MAD. A common MAD is 50 percent of the total available soil water holding capacity. The normal goal of the irrigation scheduling procedure is to help the irrigation manager keep track of the amount of water in reserve above a minimum soil water balance level to prevent water stress to the growing crop

The irrigation manager also considers the irrigation system capacity, the application amount that can be efficiently applied, the soil intake rate, and other factors when making the final irrigation scheduling decision, so irrigation scheduling tools that can be customized to a field's characteristics can greatly facilitate the irrigation scheduling decision process.

Irrigation scheduling procedures can help eliminate unnecessary irrigation water applications, although even the most rigorously followed schedule cannot prevent all losses since large rainfall events can exceed soil water storage capacity by themselves. The benefits of irrigation scheduling generally translate into increased net returns through several possible avenues, such as reducing irrigation labor and equipment operation pumping cost, and may also result in improved yields due to less water stress or less loss of fertilizer due to leaching.

One of the early obstacles to adoption of on-farm irrigation scheduling had been the time management problem of gathering, processing, and implementing scheduling on a daily irrigation cycle period. Computer technology presents the opportunity for information gathering, transferring, and processing to be done much more easily, efficiently, and sometimes automatically. Scheduling software, communication, and control technology exists that can provide management recommendations which could then be remotely implemented.

In the early 1990's, an excel spreadsheet program was introduced by Kansas State University Research and Extension to help facilitate ET based irrigation scheduling. This eventually evolved into KanSched. KanSched features have been described in previous CPIC programs and shown to be useful to a variety of climatic conditions and irrigation capacities.

KANSCHED – THE WEB BASED VERSION

This text introduces the next version of KanSched which will be a web-based. For the sake of clarity in this paper it will be referred to as KanSched3. As a web based program, users will have to set up their own user accounts and identities. However, once the user accesses the account, KanSched3 will appear very similar to the KanSched2 stand-alone version (Rogers and Alam, 2007). Figure 1 shows the initial field set up page, the user can not advance in the field until the field characteristics are entered (Figure 2).

Figure 1. Initial field set up page for KanSched3

The field set up information is the same entires as in KanSched2, crop and crop growth information, reference ET source and crop coefficients (Kco), soil and system efficiency. In KanSched3, a new feature will allow the user to select a climatic zone that will further custimize the crop coefficients to their location, although custimized Kcos can still be entered as in KanSched2.

Figure 2: Initial field set up page for KanSched3 with entries. Note the additional control options are now available.

In KanSched3, soil information related to water holding capacity is can also be selected from the list of soils (Figure 2) but will allow layers of soil to be selected as shown in Figure 3. Multiple soils can be selected, only two are shown in Figure 3. The thickness of the layer is adjusted by changing the percentage of the layer (Figure 4).

Figure 5 shows the advanced section of KanSched3 with the features of Managed Allowable Deficit (MAD), system efficiency, rainfall discount and a new feature, the SDI adjustment factor. The SDI adjustment factor could allow the user to enter a percentage value to discount the ET for an SDI irrigated field.

Figure 3. KanSched3 set page showing the multi-layered soil entry.

Figure 4. KanSched3 set page showing the multi-layered soil entry adjusted by altering the percentage depth of each layer.

Figure 5. Advanced KanSched3 field set up page.

After the field set up page is completed the budget page (Figure 6), soil water chart (Figure 7), and season summary (Figure 8) are activated. Note that in the soil water chart, the cursor can be placed in the chart area to get a date and soil water content value reading.
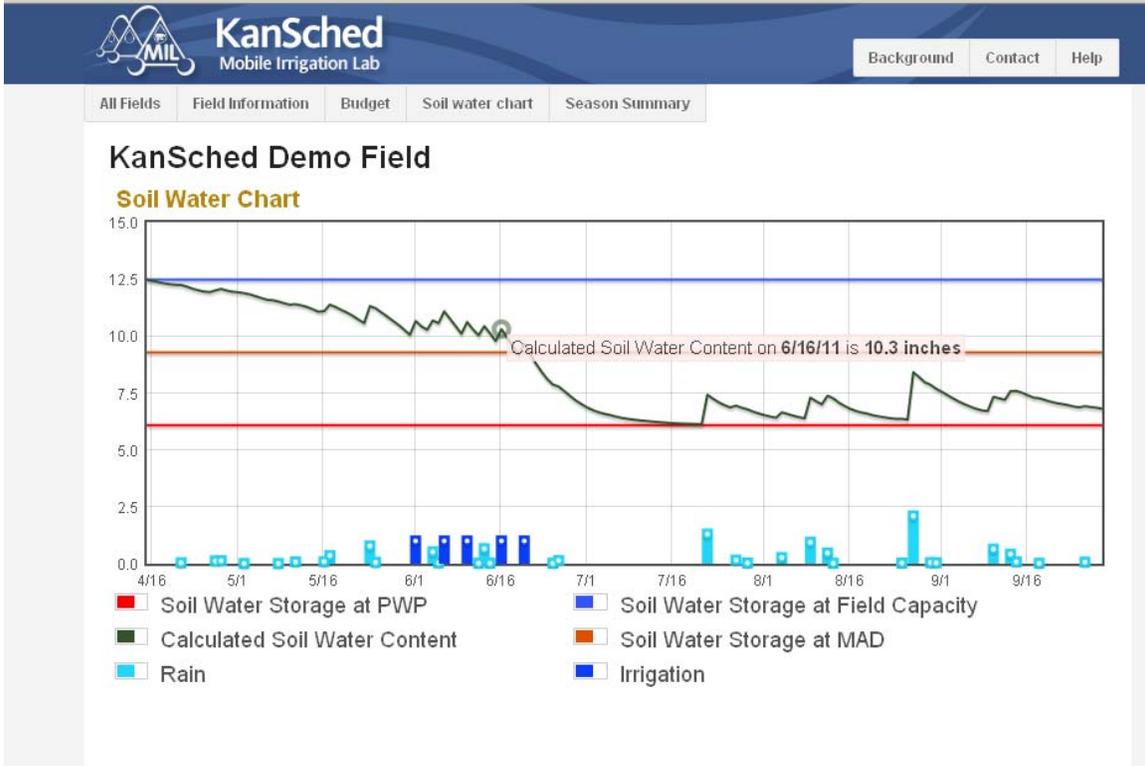

Figure 6. KanSched3 Budget page
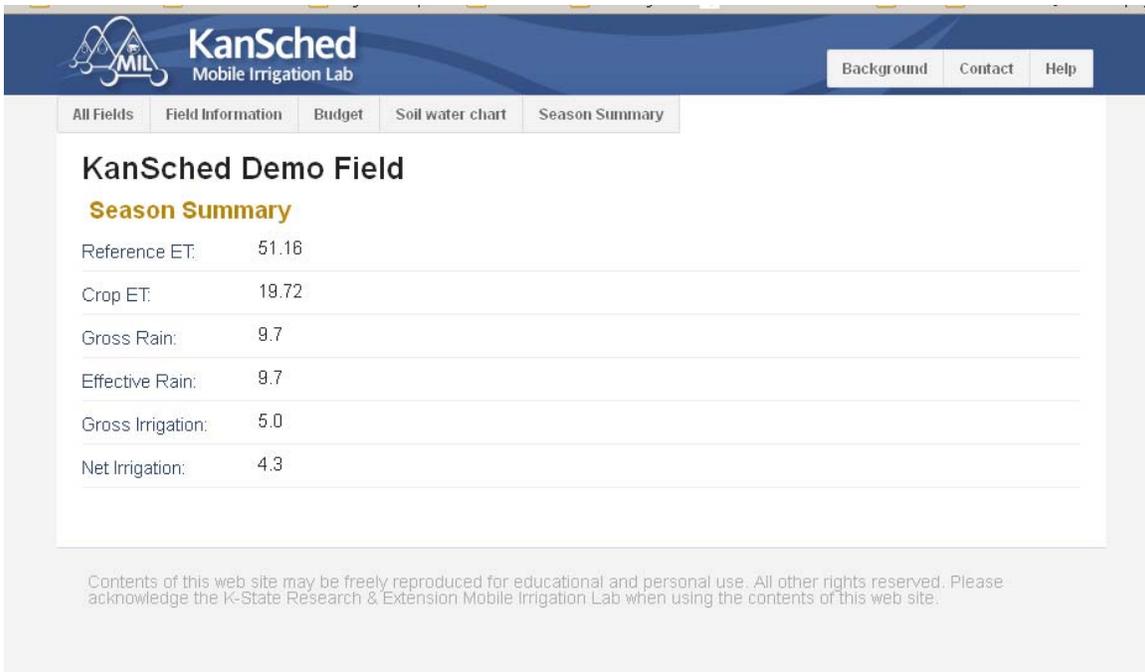
Figure 7. KanSched3 soil water chart.

Figure 8. KanSched3 season summary page.

SUMMARY

As a web-based version, new features and revisions will be automatically available to the user. At the time of the writing of this proceeding paper, several features had not yet been installed, such as the printing options. KanSched3 is an advancement to allow producers easier access to ET based irrigation scheduling as a next generation of improved irrigation management tool. KanSched3 will be distributed via the web site: mobileirrigationlab.com.

REFERENCES

Rogers, D. H. and M. Alam. 2007. KanSched2 – An ET-based irrigation scheduling tool users guide. Kansas State University Research and Extension. Electronic Publication Only. EP- 129. 12 pp. Available at http://www.ksre.ksu.edu/library/ageng2/EP129.pdf
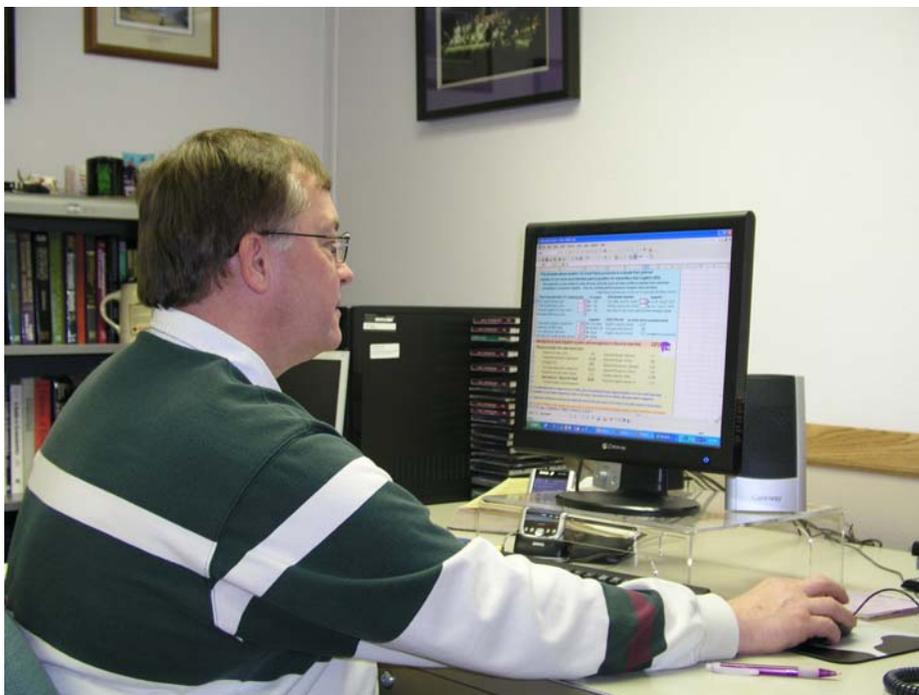
Using computers to manage irrigation decisions is a part of modern farming.