Kansas progress in ET based scheduling: Improvements in KanSched

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Keywords. Kansas, irrigation scheduling, ET, evapotranspiration, computer software

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Kansas progress in ET based scheduling: Improvements in KanSched

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Abstract: Irrigators in Kansas have increasingly accepted irrigation scheduling using climate-based ET information as a management tool. The primary scheduling tool used by individuals has been KanSched, a software package developed as part of the Mobile Irrigation Lab (MIL) project of Kansas State University Research and Extension. Producer surveys and requests for additional features have been addressed by the development of KanSched 2. This paper will update the status of MIL programs and new KanSched 2 features.

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Introduction: KanSched 2.0 is a program designed to help irrigators and water managers monitor the root zone soil profile water balance and schedule irrigation events on a field using evapotranspiration (ET) data. ET-based irrigation scheduling is a tool that can help you determine when and how much irrigation water to apply. The basic process involves using data on crop water use (crop evapotranspiration or ETc), rainfall, and soil water storage to assess when an irrigation event is needed and how much water to apply.

The original version of KanSched program was developed as part of the Mobile Irrigation Lab project, which is supported by a partnership between K-State Research and Extension, the Kansas Water Office with State Water Plan Funds, Kansas Water Resources Research Institute, and the Ogallala Initiative Project. This new release, KanSched2, offers some new features, in response to requests made by irrigators and crop consultants. These include additional crop options, including a built-in feature to account for cutting cycles on alfalfa, an irrigation forecast, irrigation fuel cost accounting, and a water record page for individual fields. Users of any of the KanSched 1.0 version series should find KanSched 2.0 familiar and have little or no difficulty in adapting to its use. KanSched2 will allow the import of field data saved in archive suing previous versions.

KanSched2

The background color scheme for KanSched2 was changed to help producers easily distinguish KanSched2 from the original KanSched, however the control buttons (now bars) still allow most of the functions to be controlled by placement of the mouse curser and clicking. Figure 1 shows the start page of KanSched2. Several of the internal improvements of KanSched2 include easier file transfer or sharing, and import and export of file information. Since KanSched has been in use by some producers for nearly ten years, the installation of KanSched2 does not automatically uninstall the original KanSched. While these files can be imported, if desired, it was thought this might be a producer preference. KanSched2 does require a few additional data entries than the original KanSched , so when the data is imported, some additional data entry is required to allow full use of KanSched2 options.

A new feature of KanSched2 allows the establishment of field collections. It is anticipated that this feature would be used by crop consultants or water mangers that may have multiple number of irrigation clients and would want to transfer information to clients individually, but not field information for other clients. Irrigators handling their own fields would most likely not want to divide their operation in this manner.

Once a field collection is made, the user of KanSched2 can start adding individual fields to the collection, using a series of input pages in the field set up option, shown in Figure 2. To help with this phase of data entry, the field inputs are broken down into a series of pages; general information, season dates, soils and roots, crop coefficients, and advanced. This allows on screen information to be provided to the user as needed. Drop down menus allow selection of crops, dates, and soil information to be selected without reentry. Once all required field set up information is activated, the other KanSched2 control buttons are activated and they then appear on the left hand side of the screen page. Notice in the Figure 2 example, a drop down calendar appears to let the user click on the desired date for entry. Nineteen different crop options are now included in KanSched2, meaning the crop coefficient information is built into KanSched for Kansas growing conditions. KanSched2 does allow additional entry of crop information in a new feature using an "add/edit custom crops" on the general information page.

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Alfalfa has also been added to KanSched2 . When alfalfa is selected as a crop, the budget page will have an additional column appear on the left to allow entry of the cutting date. Whenever a cutting occurs, KanSched2 will automatically reset the alfalfa crop coefficients. This allows the entire alfalfa growing season to be retained in one file.
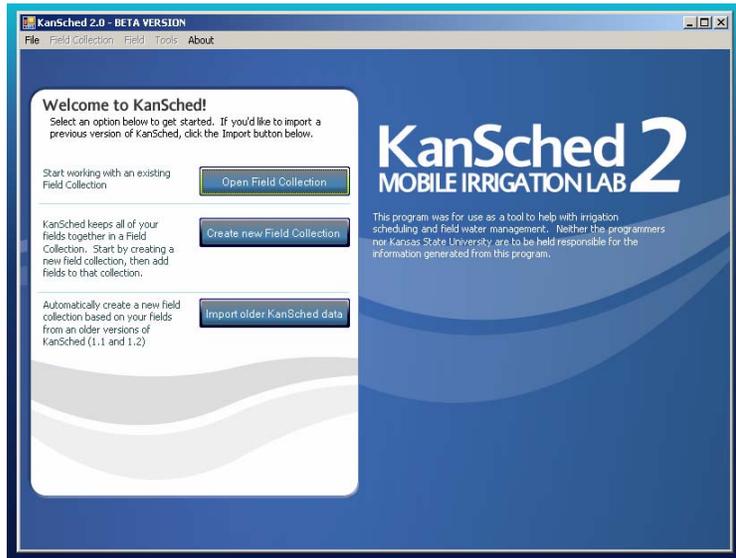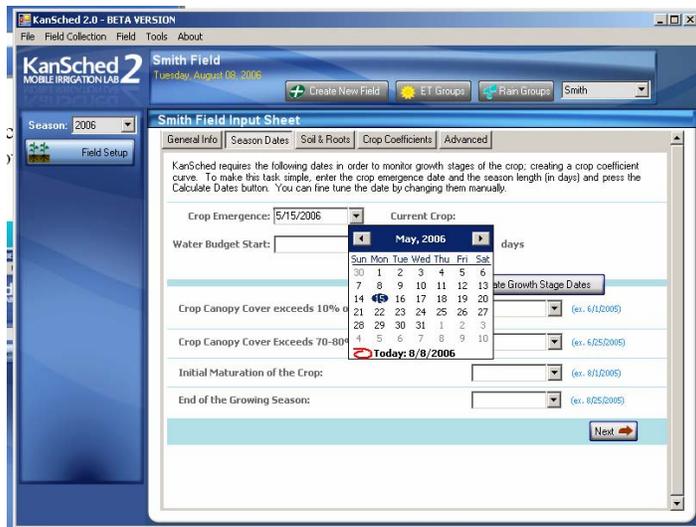

Figure 1: KanSched2 Start Page

Figure 2: KanSched2 Field Set Up page

KanSched2 will also allow the water budget to begin before the emergence date of crop. Many producers with limited capacity wells in recent dry spring seasons have wanted to apply pre-season irrigation water and have the application recorded on the water budget and soil water chart pages (Figures 3 and 4).
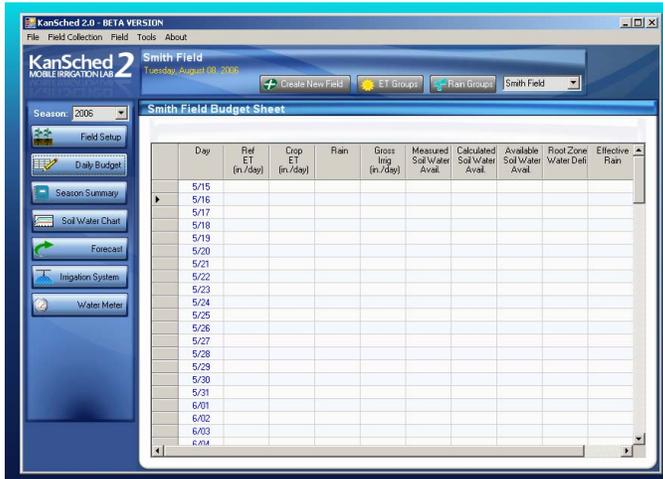
Figure 3: KanSched2 Water Budget Page

The water budget page follows the same format of the original KanSched. Daily entries of reference ET, rain, and irrigation are used to calculate the percentage of root zone soil water and the root zone soil water deficit. An entry column is available for any field observations of soil water. Any rain entry that exceeds the root zone storage capability is truncated to that amount and recorded as effective rain. Fields can also be grouped into ET groups. ET grouped fields are fields that use the same weather station source for reference ET information. Any update of the ET information in one field will result in the update of all fields within the group. Fields can also be grouped into rain groups, if one rain gauge serves more than one field.

The soil and root information, along with water budget soil water calculations, are plotted on the soil water chart. Rainfall and irrigation entries are also plotted, (Figure 4).
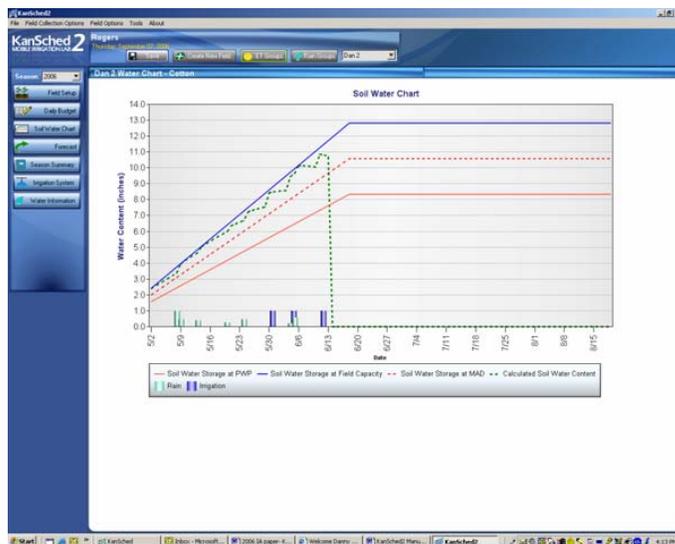

Figure 4: KanSched2 Soil water chart

Information from the water budget page is summarized and shown when the Season Summary control button is clicked. Season totals for reference ET, crop ET, rain, effective rain, gross irrigation, and net irrigation are totaled from the start of the water budget to the last entry date.

New KanSched2 Features

Three new control buttons have been added to KanSched2: Forecast, Irrigation System, and Water Records. The forecast control (Figure 5) lets the users look at the predicted soil water level five days into the future, based on the average reference ET for the previous five days and the future crop coefficients. A sliding scale allows the forecast to be made with reference ET values that are increased or decreased by up to 20 percent.
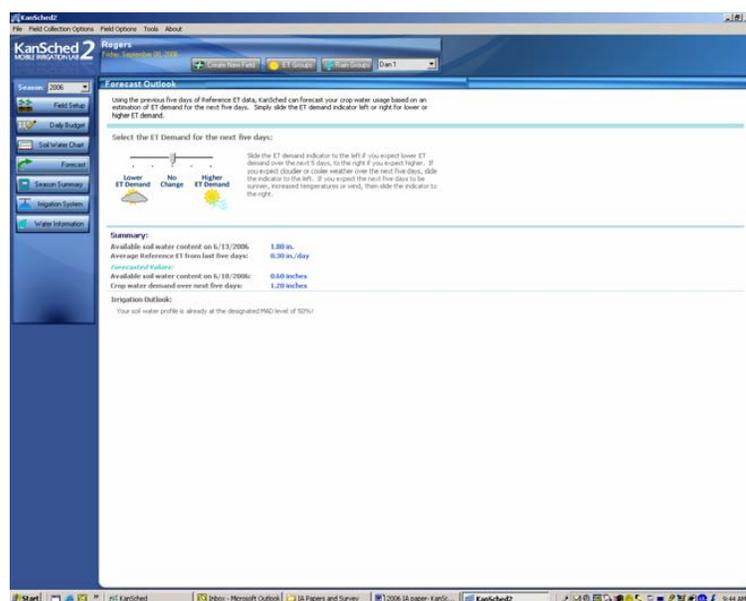

Figure 5: KanSched 2 Forecast Page

The Irrigation System page (not shown) allows the user to enter information about the pumping plant which results in an estimate of the irrigation pumping cost to be made. If this page is activated, the water budget page will show the accumulated fuel cost after each irrigation entry. Kansas irrigators have an annual water use reporting requirement. The Water Record page (not shown) allows information related to the water use report to be recorded in addition to water meter readings and any well water levels that may be taken during the year.

Summary

KanSched2 has been developed in response to Kansas producer requests and many new options and features have been added. However the new version retains the original "feel" of the original KanSched, meaning it is user friendly and easy to operate. KanSched2 will be available via the Mobile Irrigation Lab (MIL) website at www.oznet.ksu.edu/mil.