

Ikshu Kedar: Mobile app

for raising sugarcane water productivity in sub-tropics

Ram Ratan Verma*, T K Srivastava, S S Hasan and Pushpa Singh

ICAR-Indian Institute of Sugarcane Research, Lucknow, Uttar Pradesh 226 002

Adequate and timely irrigation of sugarcane is necessary for higher yield and profit. Owing to beneficial response of irrigation on sugarcane yield, frequent and excessive irrigation is often practiced that needs to be curtailed. Among various means to save water in sugarcane agriculture, use of modern information and communication technology (ICT) tools has a vast potential owing to its wider spread and easy handling. Determination of right date of irrigation is crucial both for water saving and raising the cane yield in desiccating atmospheric conditions of sub-tropics. Among different approaches of scheduling irrigation, the ratio between applied irrigation water depth (IW) and the cumulative pan evaporation (CPE) has been found the most efficient. Algorithm suitable for different crop growth stages in relation to long-term rainfall and based on IW:CPE ratio provides the base for the Ikshu Kedar mobile app. The app is designed for android mobile phones and it does not need internet connectivity once downloaded. The app determines the next date of irrigation in sugarcane with inputs such as date of planting and the date of the last irrigation. Ikshu Kedar gives the output both in speech and text mode in Hindi language.

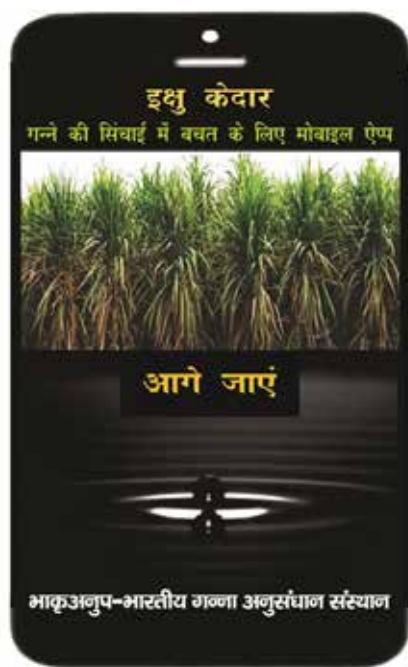
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SUGARCANE is an important long duration commercial crop grown in India traditionally for the production of sweeteners. The crop has further grown in importance owing to its use for the manufacturing of bio-ethanol for blending with petrol to run the automobiles. This not only saves precious foreign exchange but also aids in cutting the greenhouse gas (GHG) emission. Electricity co-generation is yet another utilization of the crop that bolsters the economy. With increasing need for diversified utilization of the crop, total sugarcane production needs to be raised from the existing 468–600 million tonnes by 2030. Sugarcane crop is mostly grown in the irrigated conditions and its water requirement is high as compared to the other crops. Considering the proliferation of smart phones in rural area a mobile app, Ikshu Kedar has been developed at ICAR-Indian Institute

of Sugarcane Research, Lucknow, Uttar Pradesh. Mobile apps are useful to provide instant, accurate and personalized information. Many of the mobile apps don't require internet connectivity for operation and Ikshu Kedar is one of them. Various methods for determining the dates of irrigation for sugarcane crop have been deployed and the one based on the ratio between irrigation water (IW) depth and cumulative pan evaporation (CPE) has been found to be the best, both for saving of water and raising the water and crop productivity. Since the CPE data is not available with the sugarcane growers, the mobile app, Ikshu Kedar was developed that integrates the long term rainfall and pan evaporation in the sub-tropics with the optimum IW:CPE ratio developed for different growth stages of the crop. It is very easy to handle, as the app needs only the dates of sugarcane planting and

the last irrigation date as input from the grower to work out the next date of irrigation. Based on the long-term rainfall and cumulative pan evaporation, the date of next irrigation provided by the app suits the crop needs and also effectively reduces the frequency of irrigation. This app is available on google play store for download and installation in android mobile phones.

Many mobile apps have been developed for the various agricultural crops however; the mobile apps for sugarcane are limited and restricted to provide the basic information of the cultivation methods for the crop. Further, interactive mobile app related to irrigation scheduling in sugarcane was lacking. The Ikshu Kedar mobile app has been developed to fulfil this gap. Sugarcane farmers have limited ways to reduce the cost of sugarcane cultivation as reducing the input leads to reduction in sugarcane



First page of the Ikshu Kedar app

irrigation in sugarcane field, and also confirms whether irrigation is due on a given date or not. Considering the most popular common language used and understood by the north Indian sugarcane growers, the entire Ikshu Kedar mobile application has been developed in the Hindi language.



Ikshu Kedar mobile app logo

Ikshu Kedar mobile app in an android mobile phone, it can be searched in google play store by typing Ikshu Kedar in search option or it can be also searched by following the link, <https://play.google.com/store/apps/details?id=in.gov.icar.iisr.irrigationmanagementin.sugarcane>.

- After this, clicked on the logo of Ikshu Kedar app, which will open a new window with install option.
- Clicked on install (Programs) option in this new window for downloading and installation of this app in mobile phone.
- To use this app, clicked on open option in the same window or go to home screen and click on Ikshu Kedar app logo.

Usage

- Go to mobile phone home screen and click on Ikshu Kedar logo which will open home page of the app. Click here on go ahead option.
- A new page of app will open, from here click on know the date of next irrigation option.
- It will further open an another new page of app, here set date of planting and last irrigation date in sugarcane with the help of calendar provided and click on find out the date of the next irrigation option.



Ikshu Kedar app page with multiple options

yield. This app takes care of water management even at the sugarcane maturity stage which helps in maintaining sucrose per cent in cane stalks to get good sugar recovery in sugar mills after crushing.

Ikshu Kedar

Sugarcane cultivation provides base to our rural economy. Adequate and timely irrigation in sugarcane fields is necessary along with other measures for higher sugarcane productivity. In order to get the beneficial response of irrigation on sugarcane yield, farmers keep applying irrigation water frequently and in excessive quantity. This practice leads to wastage of precious water and increases the expenditure on crop irrigation. Irrigation water saving in sugarcane has double benefits as on one side environment can be protected and irrigation expenditure can be reduced, and on the other side saved water can be utilized to promote other economic activities. Keeping all these in view, an Ikshu Kedar mobile app has been developed for irrigation scheduling in sugarcane under north Indian climatic conditions. The app is based on the scientific calculations. This app is useful for increasing irrigation water efficiency and water productivity in sugarcane crop. It determines the next coming date of

Working

The time intervals vary between two irrigations in autumn and spring season planted sugarcane. In this app, the next irrigation date is ascertained by using the crop growth stage wise IW/CPE ratio and weather data. Each irrigation depth in the app has been conceded as 75 cm. It is an integrative app in which to find out the next date of irrigation for sugarcane field, user has to enter two inputs, i.e. one as date of sugarcane planting and another one is the date on which last irrigation was provided in sugarcane field. This app provides the options like suggesting how to use it and suggestions for proper implementation of results. Being the native app, internet connectivity is required only for downloading and installing the application in mobile phone. Once the app is downloaded and installed in the smart phone, its use does not require internet connectivity. This app has been designed for considering the general weather conditions of north Indian states. The app is not recommended for saline and alkaline soils, heavy or sandy soils and water logged areas.

Download and installation

- To download and install



Input pages of the Ikshu Kedar app with date setting option

- The output, date of next irrigation will appear below in written and same output voice will come through speech text option.
- To confirm whether irrigation is due on a particular date or not, clicked on the option check from next irrigation date after point 1.
- It will open a new page of app, on this page set date of planting, last irrigation date and date on which user wants to check whether the next irrigation is due or not.
- After setting all three options mentioned above, clicked on option to check the date of next irrigation.
- The output, weather irrigation due on mentioned date will appear below in written and same output voice will come through speech text option.

Guidelines for compliance of irrigation date

- Always remember date of planting of sugarcane.
- Provide 75 mm water in each irrigation for sugarcane plant and ratoon crop.
- Keep irrigation channels free from weeds and damage.
- In case field was irrigated before planting of sugarcane then, pre planting irrigation date must be considered as last irrigation date.
- Decide yourself the irrigation date after hoeing in sugarcane fields during summer season (April–June) and then use mobile app for determination of next irrigation date.
- Nitrogen application in the standing crop must be given through urea in the side of rows of sugarcane after two days of irrigation followed by light hoeing.
- For determination of next irrigation date during the rainy season (July–September) always follow the weather forecast for irrigation.
- In case of heavy rainfall in near future, consider last date of irrigation after three days of end of rains.
- Once crop field is irrigated, after that 10 mm or less rainfall will not change the date of last irrigation for determination of next date of irrigation.

- Irrigation must be stopped before one month of sugarcane harvesting.

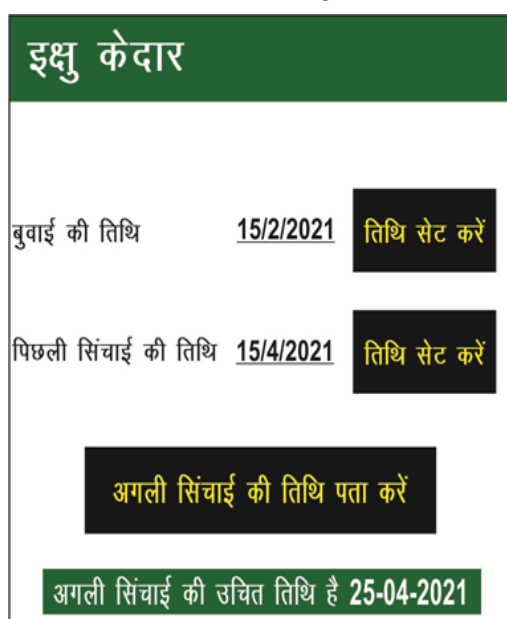
Highlights of the app

- This app is based on scientific calculation.
- It is very simple app which makes it very easy to use.
- Entire app has been made in Hindi language to make it more useful to sugarcane growers.
- Output, next date of irrigation appears in text and speech to text option.
- Necessary guidelines have been provided in the app for proper use and implementation of output.
- The app is equally useful for sugarcane plant and ratoon crop, autumn, spring and summer planted crop and early and mid late varieties.
- It avoids unwanted irrigations in sugarcane crop.
- It is useful in case of rains.
- App provides brief history of establishment of ICAR-Indian Institute of Sugarcane Research, Lucknow.

SUMMARY

Sugarcane crop is considered as high water demanding crop. Regular extraction of ground water for irrigation use has resulted in receding of the ground water table by 2–3 m per annum. Therefore, precise irrigation scheduling in sugarcane crop for efficient utilization of irrigation water is imperative. Sugarcane farmers of the north Indian states can increase irrigation water use efficiency in sugarcane crop by using the Ikshu Kedar mobile app for precise irrigation scheduling in sugarcane at different crop growth stages. The app in its present version serves mainly the plant crop and surface irrigation situations. To broaden its applicability new features like scheduling irrigation for sugarcane ratoon under mulching, skip-furrow irrigation both in plant and ratoon crops and drip irrigation methods need to be added.

*Corresponding author's e-mail: ram.verma3@icar.gov.in



Output pages of the Ikshu Kedar app