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REVIEW ON DETERMINATION OF CROP WATER REQUIREMENT AND IRRIGATION SCHEDULING BY USING CROPWAT

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Abstract: In regions where water resources are limited, determination of crop water requirement is one of the key parameters for precise irrigation scheduling. This study was carried out to determine the crop water requirements and irrigation scheduling for rabbi and hot weather crops, for the unava region at Gandhinagar. Crop Water Requirement of each crop was determined by CROPWAT model which is developed by the Food Agricultural Organization (FAO), using 7 years climatic data. CROPWAT is a computer programme for the calculation of crop water requirements and irrigation requirements from existing or new climatic and crop data.

Keywords: Crop, Water, Irrigation

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INTRODUCTION

Irrigation scheduling involves deciding when and how much water to apply to a field. Good scheduling will apply water at the right time and in the right quantity in order to optimize production and minimize adverse environmental impacts. Bad scheduling will mean that either not enough water is applied or it is not applied at the right time, resulting in under-watering, or too much is applied or it is applied too soon resulting in over-watering. Under or overwatering can lead to reduced yields, lower quality and inefficient use of nutrients. The efficiency of water in agricultural production is generally low. Only 40 to 60% of the water is effectively used by the crop, the rest of the water is lost in the system or in the farm either through evaporation runoff, or by percolation into the groundwater. Irrigation scheduling, if properly managed can offer a good solution to improve water efficiency in the farm (www.saiplatform.org). Irrigation scheduling makes sure that water is consistently available to the plant and that it is applied according to crop requirements. To carried out irrigation scheduling using CROPWAT considering method of irrigation timing, irrigation at 100% critical depletion, irrigation at fixed interval per stage and method of irrigation application, Refill soil moisture content to 100% to field capacity.Water requirements and irrigation scheduling of major crops, namely, Sugarcane, Rice, Tobacco, etc. are determined using the CROPWAT model.Because of the use of the CROPWAT the actual crop water.

Advantages of Irrigation Scheduling:-

- Enable farmers to scheduling watering to minimize crop water stress and maximize yields.
- Reduce farmer's costs of water and labor through less irrigation, thereby making maximum use of soil moisture storage.
- Lower fertilize costs by holding surface runoff and deep percolation (leaching) to a minimum.
- Increasing net returns by increasing crop yields and crop quality.
- Minimize water-logging problems by reducing the drainage requirements.

LITERATURE REVIEW

Pritha Banik1, N.K.Tiwari2 and Subodh Ranjan3 (2014) are found that using cowpat for Crop Water Assessment of Plain and Hilly Region Using CROPWAT Model were compared between plain and hilly region for rice and wheat crop to meet the irrigation demand of crops. Results were found that reference evapotranspiration of rice and wheat crop is more for the plain region as compared to the hilly region while crop evapotranspiration of rice crop is more for the hilly region as compared to plain region and for wheat crop it is more for the plain region as compared to the hilly region. Irrigation requirement of rice and wheat crop is more for the plain region as compared to the hilly region.

Dr. Falguni Parekh(2013) (Crop Water Requirement using Single and Dual Crop Coefficient Approach) is proved that the determination of crop coefficients and reference crop evapotranspiration are important for estimating irrigation water requirements of any crop in order to have better irrigation scheduling and water management. The dual crop coefficient

approach is more precise and it is best for real time irrigation scheduling, for soil water balance computations, and for research studies where effects of every day variations in soil surface wetness and the resulting impacts on daily ETc and the soil water profile are important. Dual crop coefficient approach is best suited for high frequency irrigation systems like micro irrigation systems.

S. L. Bithell and S. Smith (2011) based on his report describes the method to estimate crop irrigation water volumes for the Tindall Limestone Aquifer, Katherine, Water Allocation Plan. Estimates of volumes are needed for water allocation planning. An assessment is also given of the method's usefulness in estimating crop irrigation volumes elsewhere for water allocation plans. Such information will be of interest to water allocation planners, water users and irrigators.

Daniel R. Dourte (2007) The objective of his research was to improve irrigation management by determining the total water requirement for mature southern highbush blueberries and to compare potential water savings from different irrigation scheduling. This was done by using a water balance to measure the water requirements of blueberries grown in pine bark and a pine bark and soil incorporation.

(Allen et al., 1998) he comprises of the water lost through evaporation from cropped field, water transpired and metabolically used by the crop plants. The actual crop water use depends on climatic factors, crop type and crop growth stage. For the determination of crop water requirement, the effect of climate on crop water requirement, which is the potential crop evapotranspiration (ETo) and the effect of crop coefficient (Kc) are important.

(Ayarsa et al. 1999) are proved that the Use of subsurface drip irrigation (SDI) has progressed from being a novelty employed by researchers to an accepted method of irrigation of both perennial and annual crops. Results from these studies demonstrated significant yield and water use efficiency increases in all crops. Use of high frequency irrigation resulted in reduced deep percolation and increased use of water from shallow ground water when crops were grown in high water table areas. Uniformity studies demonstrated that after 9 years of operation SDI uniformity was as good as at the time of installation if management procedures were followed to prevent root intrusion.

Sheng-FengKuo , Bor-Jang Lin and Horng-Je Shieh (2001)(CROPWAT MODEL TO EVALUATE CROP WATER REQUIREMENTS IN TAIWAN) are proved that This study hence shows a more important hint that the CROPWAT irrigation management model could be used to effectively and efficiently to estimate the agricultural water requirements with different cropping patterns. This will facilitate the IAs in Taiwan to meet the possible change of irrigation management after Taiwan entering the WTO, due to the expected impacts to agricultural sector.

Sander J. Zwart (2004) is found that the more produce of food with help of less, which can be achieved by increasing Crop Water Productivity (CWP). The variability of CWP can be ascribed to: (i) climate; (ii) irrigation water management and (iii) soil (nutrient) management, among others. The vapor pressure deficit is inversely related to CWP. Vapor pressure deficit decreases with latitude, and thus favorable areas for water wise irrigated agriculture are located at the higher latitudes. The most outstanding conclusion is that CWP can be increased significantly if irrigation is reduced and crop water deficit is interdentally induced.

Samson (2005), determined stage wise and seasonal water requirements of Haricot bean at Melkassa with four non-weighing type lysimeters and he get the average measured ETc values of 36.5, 111.0, 234.7 and 65.8 mm for the initial, development, mid-season and late season stages respectively for the cropping period of 21 November to 7 February 2005.

CONCLUSION

After reviewing mentioned research paper, it clearly depicts that the capacities for modelling the crop response to changing climate and to the adaptation practices need a serious reconsideration.

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