

Cotton2K—Management Tools for Irrigated Cotton

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Cotton2K version 6.2 Modifications

New features include updated appearance and user-friendly functionality (Figures 5 - 8)

The model now works on 32- or 64-bit Windows systems

- The user has a choice of a cloud- or local PC-based interface with a tab-driven design
- The software is linear, cohesive and intuitive work flow to the model input setup
- It was created using the most advanced technologies including HTML5, CSS3, & Java Script applications to ensure optimum operability on the Cloud
- Optional calendar date in the chart format (mm-dd-yy) in addition to Days after Emergence or Day of Year to add clarity to the output (Figure 9)
- IN Cotton2K version 6.2 allows for easy selection of default units (English or metric) when inputting the data eliminating a large source of error and frustration from the older version

Input file formats are the same as earlier versions of Cotton2K so no adjustments are needed to use existing data files

Future Work on Cotton2K

Incorporate a weather query engine into the new framework to gather current or archived climate data for site-specific modeling

Update cotton cultivar files, i.e., phenology and morphology, to include the most popular cotton varieties

Host Cloud-based web version of Cotton2K to facilitate its use by producers and consultants across the cotton Beltwide region of US

Allow producers and consultants to test the new user interface and incorporate their suggestions

Develop a "Wizard Driven" graphical interface to query the user for "required" information helping to lead the user through complicated data input

History of Cotton2K

- The use of simulation models to manage crops was a concept introduced in the 1980's
- IN Dr. Avi Marani, Professor Emeritus, School of Agriculture of the Hebrew University of Jerusalem, introduced the cotton model Cotton2K that is an open source Free Software

A simulation model that was specially adapted for irrigated cotton production in arid regions and thus our interest in its application for the Texas High Plains

Input needed to run the model

I Climatic data (short-wave irradiance, air temperature and humidity, wind speed, and rainfall) on either a daily or hourly time step (Figure 1 & 2)



Cotton 2K Dashboard

Simulation Profiles

Profile Name	Description	Year ≎	Last Run Date	Status ≎
BigSpringExp09	Well Water Experiment, Big Spring 2009	2009	5/12/2010	Success
TestPima1	Test Pima 1, 2004 - Adjusted	2005	6/2/2006	Success
WS94T	WSFS 1994 T5 - irrig by model, high water,normal N.	1994		Missing Input
ConchoOne	Concho County Uniform	2012	4/30/2012	Success
CottonVarOne	Cotton Variety Trial One, June 2010	2010		
CottonVarTwo	Cotton Variety Trial One, June 2010	2010		
SynthOne SynthOne	Synthetic Fertilizer Test - 1 of 5 - May 2011	2011	5/05/2011	Input Error
SynthTwo	Synthetic Fertilizer Test - 2 of 5 - May 2011	2011		
CottonVarTwo	Cotton Variety Trial Two, June 2011	2009	5/12/2010	Success
ParasiteResistOne	Parasite Resist Primary - transplant date April 2007	2007		
howing 1 to 10 of 12 entries				
Delete Selected Run Selected Crr	eate New Profile Copy Selected to New Profile			Help Print Selecter

Figure 5. New appearance of Cotton2K version 6.2, which can be deployed on the Web to make use of Cloud-based computing.

Simulation Profiles		Simulation Profiles
Show 10 v entries		Show 10 v entries
Profile Name	Description	Profile Name
Name: BigSpringExp09 Description:	Well Water Experiment, Big Spring Year: 2009	 ✓ Input Files General Climate Data: BigS2009FromDH.gcf ▼ Edit
Start Date: 04/1/2010	Lat: 32.981337 Long: -97.01893	Soil Hydrology Data: BigS2009.hyd Edit Initial Soil Conditions Data: BigS2009F.int Edit
Planting: 05/12/2010		

Figure 2. Daily climate data.

Initial conditions of soil water content and nitrogen (Figure 3) General soil properties related to the soil hydraulic properties (Figure 4)

Soil Initial Conditions Da	ata					Ed	lit Se	oil Hydrol	ogy Data								
File name : JD_BU	JSHLAND.INT				Help	F	ile n	name :	JD_BU	MEAS.HY	D						He
File description : Bushla	and Lysimeter	Field				Fil	le de	escription :	Bushlar	nd Lysimete	er Field						
Delete with Checking	Print Fi	le Save	File As	Save File	Cancel	So	oil W	Vater Poter	ntial (bars)	at Field Ca	pacity	-0.3	-	Delete wit	h Checking		Print Fil
Nitrogen units : C						So	oil W	Vater Poter	ntial (bars)	for free drai	nage	-0.15		Add Row	Inse	rt Row	DeleteF
e	Kg. / Ha.						e	cm to end of layer	Residual Water Content	Saturated Water Content	Alpha Coeffi- cient	Beta coeffi- cient	Saturated conduc- tivity,	Conduc- tivity at FC,	Bulk density, g/cm3	Clay %	Sand %
Soil Depth	NH4 Nitrogen Content	NO3 Nitrogen Content	Organic Matter, % by Weight	Water Content, % of Field Capacity			1 2 3	28.0 120.0 201.0	0.1400 0.1700 0.0520	0.5300 0.4300 0.4580	0.0530 0.0230 0.0430	1.5150 1.2390 1.2700	cm/day 110.600 1.900 75.340	cm/day 0.000 0.000 0.000	1.246 1.511 1.436	35.0 45.0 30.0	30.0 30.0 55.0
0-15 cm	0.000	15.000	3.000	50.000													
15-30 cm	0.000	15.000	3.000	50.000													
30-45 cm	0.000	15.000	3.000	75.000													
45-60 cm	0.000	15.000	3.000	75.000													
60-75 cm	0.000	10.000	1.200	75.000													
75-90 cm	0.000	10.000	1.200	75.000													
90 - 105 cm	0.000	10.000	1.200	75.000													
105 - 120 cm	0.000	10.000	1.200	75.000													
120 - 135 cm	0.000	10.000	0.000	75.000		S	elect	t a soil lay:	er before c	omputing o	r checking						
135 - 150 cm	0.000	10.000	0.000	100.000													
150 - 165 cm 165 cm	0.000	10.000	0.000	100.000 100.000			C	ompute Pa	arameters	Chec	k Paramete	ers S	ave File As	Sa	/e File		Can
Figure 3.	Soil in	itial co	onditio	ons dat	а.		Fi	gure	4. 5	Soil h	ydro	ology	data	a.			

Latitude and longitude, and elevation of the site Field data related to row spacing, plant density, and row configuration (e.g., skip rows)

Agricultural management activities (irrigation, tillage, growth regulator applications, and fertilization, defoliation)

Figure 6. The model is the same, but the interface provides a more streamlined and efficient workflow.

Cotton 2K Dashboard

Profile Name	\$	Description							
BigSpringExp09	Well Water	Experiment, Big Spring 2009)						
Simulation Inputs Output	ts								
	Simu	lation Recults							
Chaur 10 - antrian	Siliu								
Show 10 V entries			Search:						
Description	Run Date	Status ≎	Actions						
			Charts Soil Maps						
Well Water Experiment, Coo	5/12/2012	Success	Files						
			Charts Soil Maps						
Well Water Experiment, Hot	6/1/2012	Success	Files						
			Charts Soil Maps						
Well Water Experiment		Eucopee							

Figure 8. Status, date and action fields allow for quick assessment of output information.

Uses of Cotton2K

- Provide tools to producers, consultants and researchers to manage a cotton crop throughout the growing season
- To investigate the response of cotton to different irrigation and nitrogen levels in answering what if questions

Figure 7. Tabs and drop-down menus update the appearance and functionality of the program.



Figure 9. Calendar Date has been added as an option for Chart output improving the interpretation of the graphs. This series of charts indicates the various X-axis options now available in Cotton2K.

We would like to hear from you... Suggestions based on previous use of the model Ideas about workflow or format improvements

General model use issues or suggestions

We would like to express our appreciation for the funding **Prediction mode to plan irrigation schemes under different weather**

provided by Cotton Incorporated for this project.

conditions