

Annex 4: Guidance for Irrigation Efficiency and Water Productivity indicators

Calculation of the rainfall data and daily Kc values











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A guide to obtaining rainfall data

Rain gauges can be sourced from hardware or gardening supply stores, or even homemade (an internet search can provide a variety of prototypes, e.g., <u>https://www.education.com/science-fair/article/DIY-rain-gauge/</u> made from a drink bottle).



Volume of rain is recorded after each event (in millimetres) in a rainfall chart (e.g., https://grida-files.s3.ap-southeast-2.amazonaws.com/s3fs-public/2020-10/QRIDA%20Rainfall%20Chart%202021_FILLABLE.pdf) and summed over the growing season. In the example below, 10 mm was recorded on 2nd January, 20 mm on 5th January and 5 mm on 6th January, giving a total of 35 mm for the month to date.

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Rainfall data can also be obtained from meteorological data. For instance, official rainfall data from the Meteorological Department for India can be found at: https://mausam.imd.gov.in/imd_latest/contents/ rainfall_statistics_3.php



A guide to obtaining daily Kc values from IrriSAT

Step 1: Open the IrriSAT page: https://irrisat-cloud.appspot.com/

Step 2: Create account and sign in.

Step 3: Navigate map to region of interest.

Step 4: Locate sample fields and zoom in.

Step 5: Create a polygon for each sample field by first pressing the plus sign (indicated below with light blue circle) from the control buttons at the top of the screen.





Step 6: This will promote you to "Add a new field".

Step 7: Click the cursor on each corner of the field to mark out the polygon.







Step 8: Enter a name for the field and click "Add".





Step 9: Repeat for all sample fields.



Step 10: To access fields and extract Kc values, click the "My Fields" button.





Step 11: Chose a field by clicking on the name of the field and the map will zoom to that field.

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Step 12: Click within the polygon.

Step 13: A dialogue box will come up for that field.

Step 14: Wait while it loads.





Step 15: IrriSAT will calculate the crop coefficient box at the top but the evapotranspiration box will fail as the reference ET is linked to the Australian Bureau of Meteorology, and no reference ET is available for areas outside Australia.



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Step 16: To extract the daily Kc values, click the "Data" tab at the bottom left of the "Crop Coefficient" box.

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Step 17: Now click the "Field Settings" tab (cog icon).

Step 18: Fill in the appropriate "Planting Date" and "Harvest Date" and remember to click the adjacent blue "Apply" button after completing both.





Step 19: Now click on the "Crop Health" tab (plant icon).

Step 20: You can now extract the Kc data for the selected period by clicking the "Download CSV" tab.





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Step 21: Once you have downloaded this file, open it in a spreadsheet.

Step 22: The Kc average and date (columns A and C) are all that is needed from this output.

But please note that where Field Visibility (%) was zero (during the satellite pass), there will be no Kc estimate for the period until the next pass of the satellite. These will be indicated by a Kc value of negative 999. All negative Kc values will need to be corrected. Instead use the previous Kc value (row above) or an average of the previous and next values (average row above and row below).

Step 23: You can now input reference ETO. In the example below, reference ETO is taken from Giridhar et al. Figs 1-12 were calculated on a monthly time frame.

Step 24: The next step is to calculate the ETc by multiplying the Kc by the corresponding ETO values.

Step 25: Finally, to calculate cumulative ETc, multipy ETc (column D below) by the number of days between readings (8 days), this will give the cumulative ETc over those 8 days (column F). The sum of all cumulative ETc values over the growing season gives the overall crop water use of cumulative ETc.



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13 22	04/2020	0.108801186	5 6.5	0.70720	7712	8 5.657661694																		
14 30	04/2020	0.039331793	6.5	0.25565	5653	8 2.045253227																		
15 8/	05/2020	0.027032596	5 9.0	0.24329	3366	8 1.946346925																		
16 16,	05/2020	0.006113332	9.0	0.05501	9984	8 0.440159868																		
17 24	05/2020	0.027617186	5 9.0	0.248554	1676	8 1.988437406																		
18 1	06/2020	0.118034911	L 9.5	1.12133	1653	8 8.970653225																		
19 9,	06/2020	0.090417725	5 9.5	0.85896	3384	8 6.871747075																		
20 17,	06/2020	0.172982843	9.5	1.64333	7009	8 13.14669607																		
21 25	06/2020	0.082565118	3 9.5	0.78436	3624	8 6.274948994																		
22 3/	07/2020	0.086622235	5.0	0.43311	1177	8 3.464889415																		
23 11/	07/2020	0.219169972	2 5.0	1.09584	9861	8 8.766798885																		
24 19	07/2020	0.805975542	2 5.0	4.02987	7708	8 32.23902167																		
25 27,	07/2020	0.58680557	7 5.0	2.93402	7848	8 23.47222278																		
26 4)	08/2020	0.651778791	4.0	2.60711	5165	8 20.85692132																		
27 12	08/2020	0.793221475	5 4.0	3.17288	5901	8 25.38308721																		
28 20,	08/2020	0.856482024	4.0	3.42592	3094	8 27.40742475																		
29 28	08/2020	0.524953713	3 4.0	2.099814	4853	8 16.79851883																		
30 5/	09/2020	0.826012893	4.5	3.71705	3019	8 29.73646415																		
31 13,	09/2020	0.814053175	4.5	3.66323	9287	8 29.30591429																		
32 21,	09/2020	0.714325207	4.5	3.21446	3432	8 25.71570745																		
33 29	09/2020	0.780447552	4.5	3.51201	5984	8 28.09611187																		
34 7,	10/2020	0.705283915	5.0	3.52641	3574	8 28.21135659																		
35 15/	10/2020	0.560911939	5.0	2.80455	9093	8 22.43647754																		
36 23	10/2020	0.649157232	5.0	3.24578	5159	8 25.96628927																		+
37 31/	10/2020	0.64915/232	5.0	3.24578	122	a 25.96628927																		+
38 8/	11/2020	0.649157232	8.5	5.5178	5047	8 44.14269176																		
39 16/	11/2020	0.088245293	8.5	0.75008	+99Z	a 6.000679935																		
40 24	11/2020	0.05966/963	8.5	0.50717	/000	8 4.05742133																		+
41 2)	12/2020	0.1/9350337	2.0	0.35870	J0/4	a 2.869605388																		
42 10	12/2020	0.179350337	2.0	0.35870	Jb /4	8 2.869605388																		-
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