Irrigation and Drainage
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Lecture - 60
Cropwat

Friends, this is the lecture number 60. This is the last lecture of Irrigation and Drainage. So, irrigation planning and management using Cropwat. So, in this we are going to see how model like irrigation model called a cropwat can be used to determine the crop water requirement as well as irrigation scheduling for a particular crop or if you have multiple crops ok.

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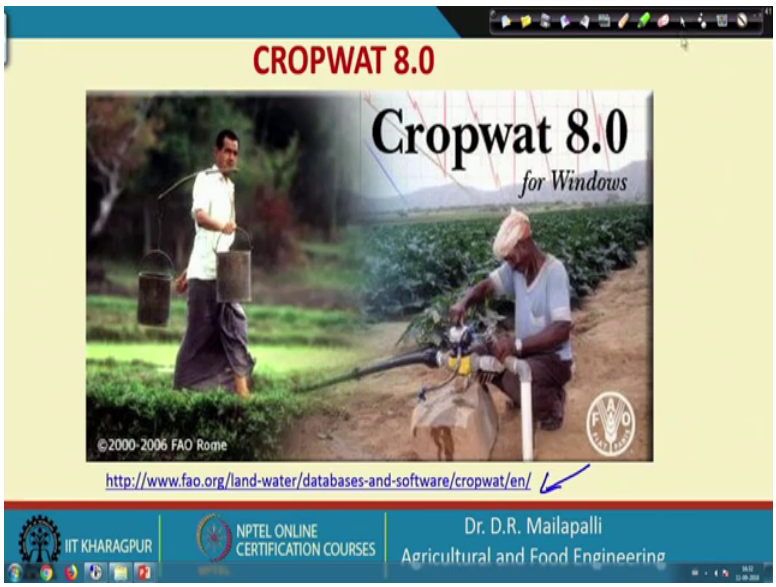

So, in this the cropwat is freely available on internet. So, it can directly download it from FAO site. So, there is a link is given here you can go through this link and then you can download it and install it in your PC's or laptops and you know run the model for estimating the crop water requirement and irrigation scheduling ok.

So, here there is a link. So, you can directly get or you can go you can type in a Google search engine as cropwat, then definitely it will that will lead to you know software download window or download page and you can download the software cropwat.

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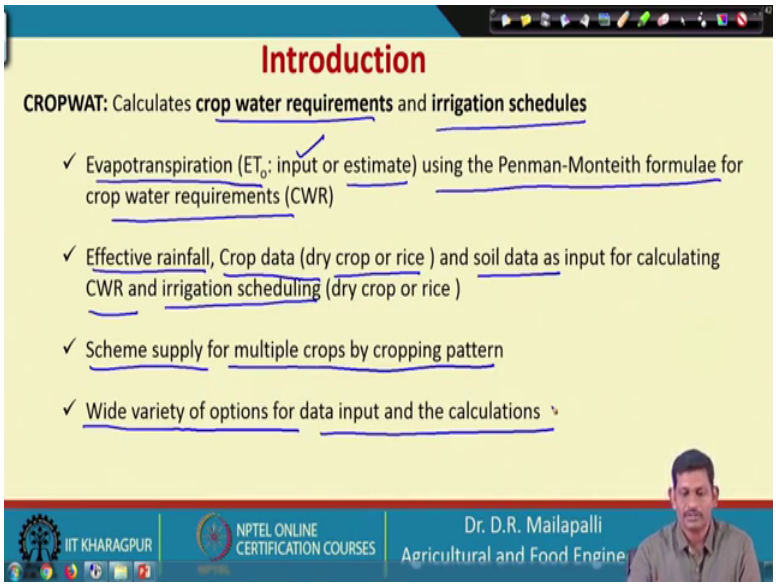

So, here so, the cropwat, so, the basically it calculates the crop water requirement and irrigation schedules ok. So, these two functions of the cropwat so, basically it has different modules. There are some input modules and then calculation modules which also the same module the outputs are going to display right. So, basically there are 5 input modules and 3 calculation modules. So, for example, here the evapotranspiration ET 0; so, this can be given as input or it can be estimated using some climate parameters or weather data.

Basically using the Penman-Monteith formulae for crop water requirements and the other one is effective rainfall. So, knowing the rainfall data the effective rainfall will be calculated based on you know different criterias on his fixed percentage or SES curve number. So, all soil conservation SES curve number method all these things and crop data for dry crop or rice crop rice means the wet crop and soil data input for calculating upward requirement and irrigation scheduling ok; so, and then scheme supply for multiple crops by cropping pattern.

So, if you have multiple crops to be irrigated or scheduled and there is a scheme supply you know the calculation available and cropwat is widely wide variety of options for data input and calculation. So, there are several options are available in order to calculate and also they give input right.

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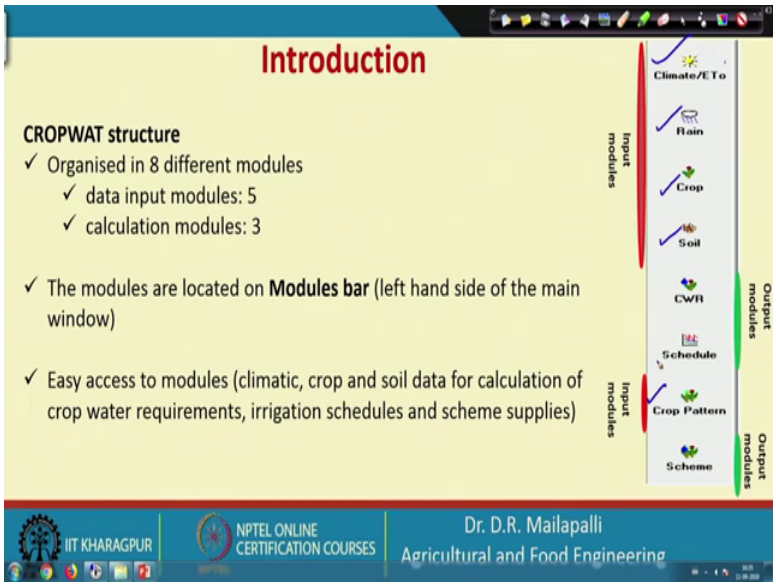

And then the structure of cropwat if you see, this win I mean this bar. So, if you open the cropwat window. So, there is a left side there is a straight bar if you see this is these are the inputs like a climate or ET or rain or crop and soil right. So, and there is a crop pattern if you have multiple crops; so, these are the inputs right. So, and the outputs or the calculation window; so, like here the crop water requirement and schedules and schemes the schemes basically for like a crop patterns. So, if you have multiple crops.

So, that will give outputs. So, it organized in 8 different modules. So, data input modules, there is a 5 and calculation modules are 3 and here the 5 in the. I mean 5 in data input modules are 1, 2, 3, 4 and there are 5 and the 3 calculation modules or crop water requirement, schedules and schemes. Then the modules are located on module bar it looks like this and easy access to modules like climate crop soil data for calculation of water requirements irrigation schedules and supplies

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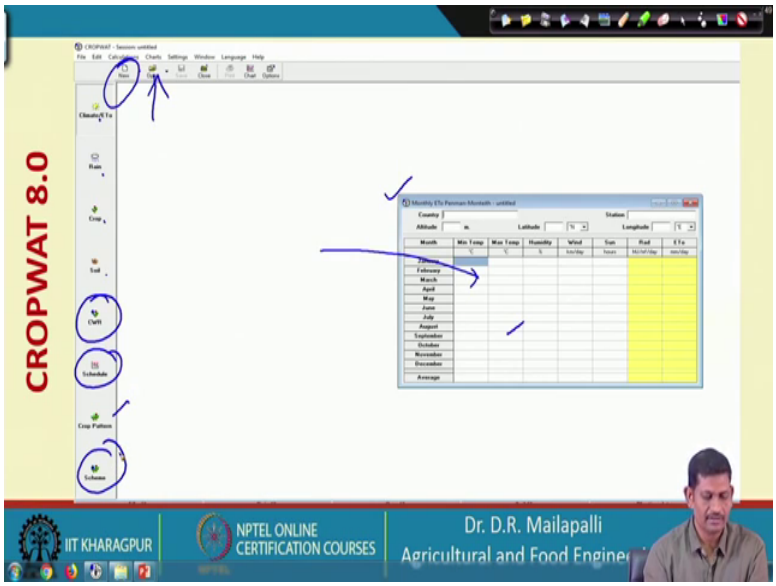

So, if you see the cropwat window; once we double click the I mean icon on the desktop a cropwat, so, it looks like this. So, it can as I explained, it consists of you know climate ET 0 rain as these are the inputs and crop. This is input soil as a input and crop pattern as input. So, these inputs and the rest CWR; so, these are the outputs like I mean calculation windows cropwat requirements schedule and scheme supply. So, these three are the output.

So, and then the other things if you look at there is a new you can you know open the new window and start. So, then open ok so, click on each if you click on this right; so, this window will appears this is called monthly Penman-Monteith this one. And the moment if you open it; so, there is there are some files already available you can click on that and directly you can you know export that sorry import that data to you know this data sheet and then you can click the rain and the crop and the soil. So, all these inputs after giving inputs and then you can click crop water requirement and the schedule ok. If you have multiple crops you can click crop pattern and then, it will give the the schemes. So, this is simple and then a very useful tool developed by FAO ok.

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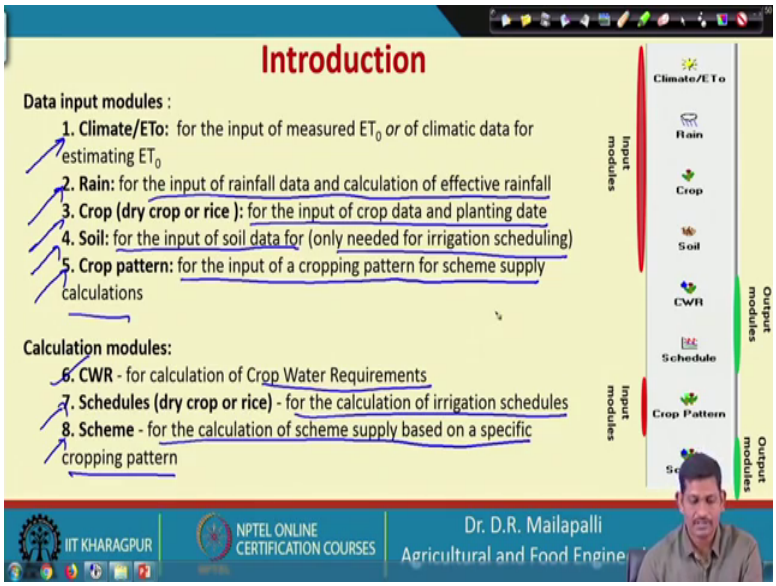

So, here oh data input modules. So, as I just mentioned the climate or ET. So, for input measure it is 0 under rain for the input of rainfall data and calculation of effective rainfall and crop dry crop generally you know maize all those things rice since, it is wet crop for the input and crop data and planting dates. And soil for the input of soil data are only need for irrigation scheduling.

Crop pattern for input of cropping pattern for scheme supply calculations: because if you have multiple crops, you can use the crop pattern to decide when to irrigate, how much to irrigate for the particular crop. And calculation modules crop water requirement for calculating the crop water requirements schedules dry or wet crop for calculation of irrigation schedules scheme for calculation of scheme supply based on a specific cropping pattern ok. So, we are going to see one by one here.

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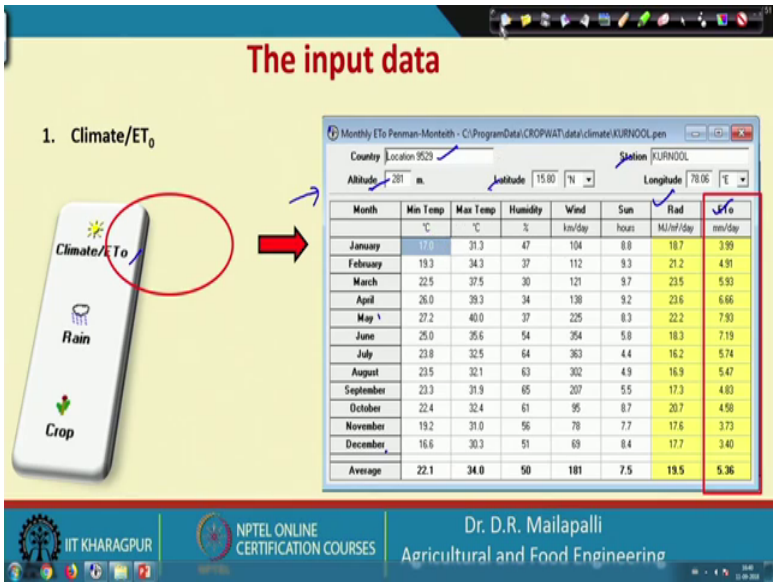

So, for example, here the moment you click the climate right and this particular window will appear and then you can punch the input data or you can also call or import the data from open window right. So, here for example, this location is given latitude longitude and this is the station name is given and then this is the month Jan, February, March, April up to December and minimum temperature. These are climatic data or climate data and then once you punch all the data. So, the radiation is calculated and ET 0 also been calculated.

So, you can also you know give as input. So, these values can be changed I mean during the run. So, this is one this is to enter climate input data and the next is rain.

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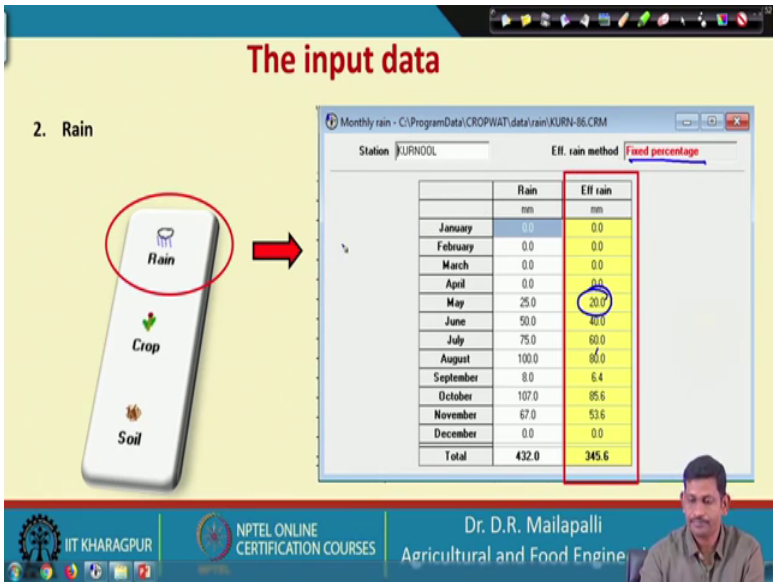

So, rain input data. So, it has again there is a open and then once you can also import the data right by exists from the existing file. This is the rain monthly rainfall and effective rainfall. So, this is the method is here the fixed percentage method the for example, here 25 20. So, it is you know 80 percent or it has a 10 percentage the loss and then effective I mean effective rainfall is eighty percent; so, all case of 80 percent 80 percent 80 percent. So, you can also change the effective rainfall method.

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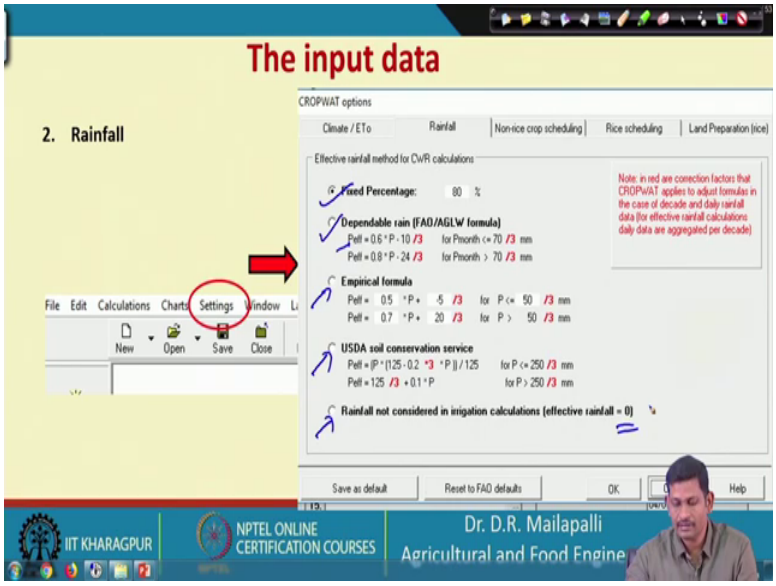

So, there are some methods available if you see this. So, the methods are here you go to settings or so, there is a fixed percentage sorry. So, if you see this there is a fixed percentage method eighty percent as I said it can also. So, dependable rain FAO and there is formulas effective is equal to 0.6 into P minus 10 by 3 ok. So, this way empirical formulas can be used a soil conservation service and rainfall not considered in irrigation calculation effective rainfall will be 0. So, if you do not want to use the rainfall into calculations, you can opt for this.

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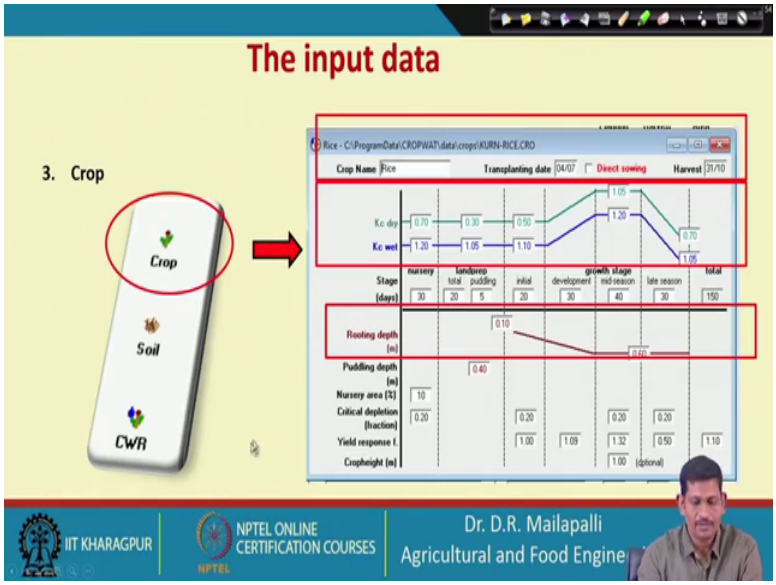

And then the third one is a crop. So, crop input. So, the basically for crop data is crop coefficients ok. So, that is a K c dry and K c wet ok. So, then the stage nursery stage land preparation stage grow stages and the total ok. And then root depth at so, root depth is given here at the different stages 0.1 at land preparation I mean at initial stage and then grow stage 0.6 meters and paddling depth nursery area; critical depletion yield response; all inputs can be you know changed or you can also import from the existing file here.

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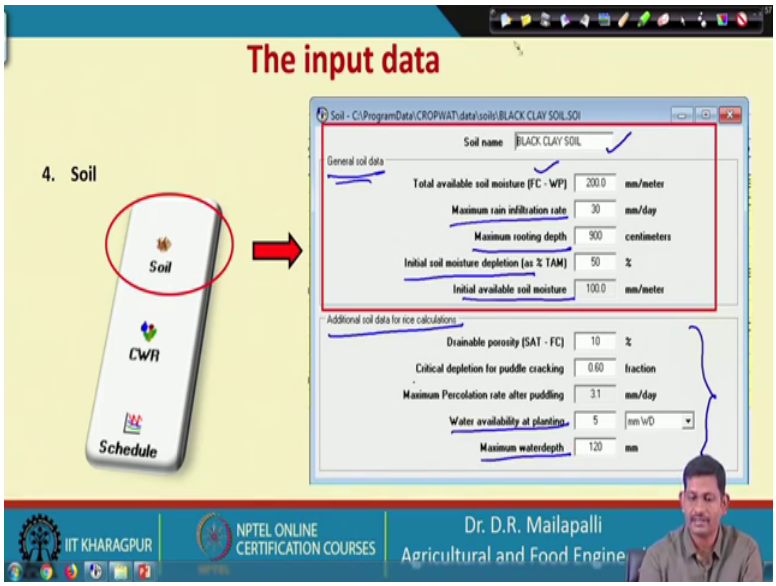

And the next the fourth one is the soil. So, soil input is like soil name and general soil data like FC minus WP; the field capacity minus wilting point maximum rainfall rain infiltration rate, maximum root depth, initial soil moisture depletion initial available moisture ok.

And you can also have some additional data for exclusively for rice; if you are choosing for rice. So, you may have to give this data; so, drainable porosity, critical depletion of puddling cracking, maximum percolation rate after puddling, water availability of planting maximum water depth. So, these data needs to be or need to be added into the soil input window ok.

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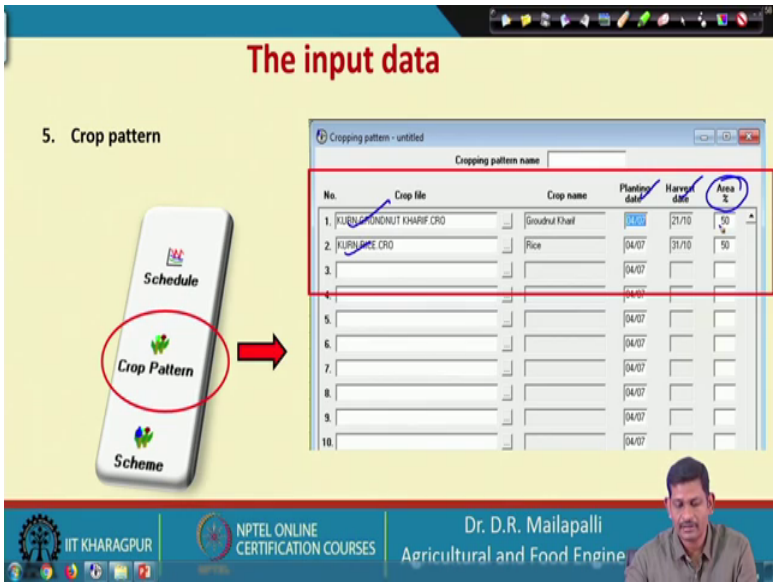

And the next is crop pattern. So, the crop pattern if we have multiple crops; for example, here one crop groundnut and other one is rice right. So, you are growing crop name is given and planting date 04 and harvesting date and area this is important area for I mean the crop area per percentages over 100 percentage how much is the area for particular crop number 1 and crop number 2 ok.

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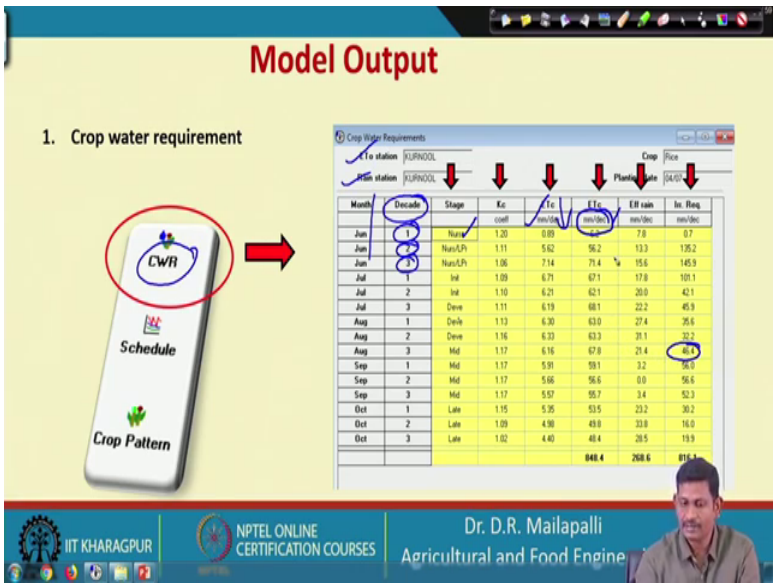

So, this one and then and then model output or calculation windows calculation 6 windows. If you see crop water requirement CWR, so, the window looks like ET 0

station rain station and then this is month on column number one decades. So, decade in the sense; so, the first decade first 10 days, second 10 days, third 10 days in a month. So, it is decayed in the sense first 10 days or 10 days time to decade. So, a stage here nursery stage right all these stages are given Kc value for different stages Kt ET c the crop water crop evapotranspiration and this is you know this is a daily basis and this is decade basis an effective rain is given irrigation requirement is given. So, this way you can understand it different you know grow stages. So, what is irrigation requirement so, that is a crop water requirement is calculated for the particular crop.

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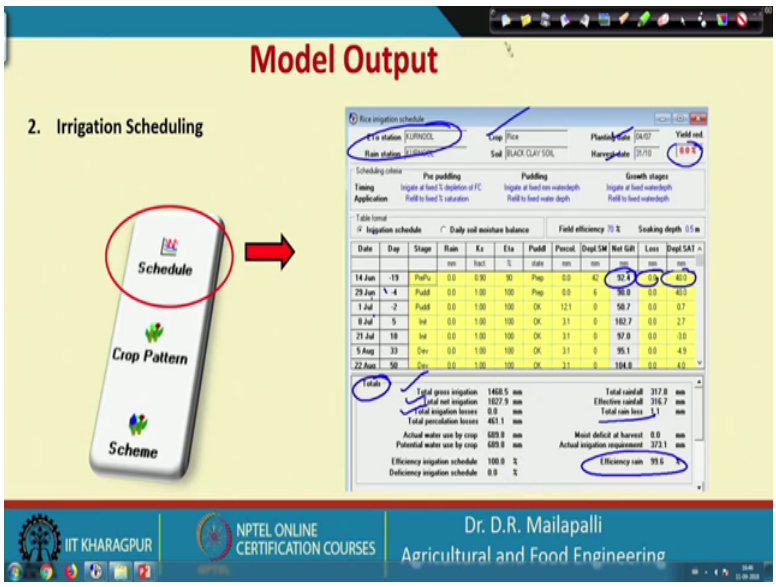

And the next is irrigation scheduling. So, the scheduling window looks like this I mean the station value and the crop and then planting date and harvesting date and yield reduction is given pre puddling, puddling and grow stages. So, if you see this irrigation schedule; so, 14, 29, first July, 8 th July, 21st July. So, like that you have to give irrigation right and percolation dependent net you know give and loss and depletion; so, all these things.

So, this is the totals of a total gross irrigation, total net irrigation, total irrigation losses all these things you can estimate irrigation like efficiency rain total rain loss. All these things you can you know calculate using the cropwat and the other one is scheme supply.

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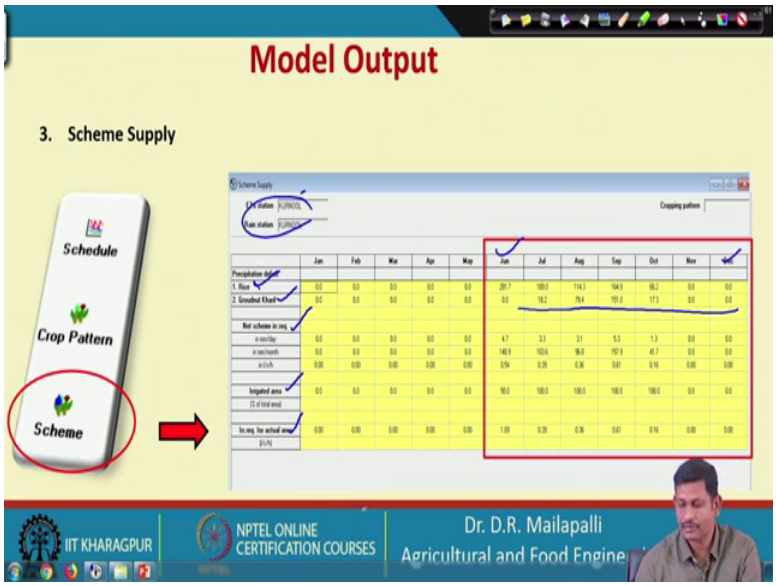

So, if we have multiple crops; so this is the again you see the station name here ok. This is the station name and then crop pattern for example, rice here right; rice and ground nut. So, these two our plant so, this is June to December right and then ground nut similarly it is a parallel ground nut also grown and net scheme irrigation requirement irrigated area and irrigation requirement for actual area.

So, all these things can be estimated in K in using the cropwat and a scheme supply if you have multiple crops. So, this is the I mean this simple model cropwat which is developed at FAO and this is basically used to determine the crop water requirement and irrigation scheduling for both I mean single as well as multiple crops.

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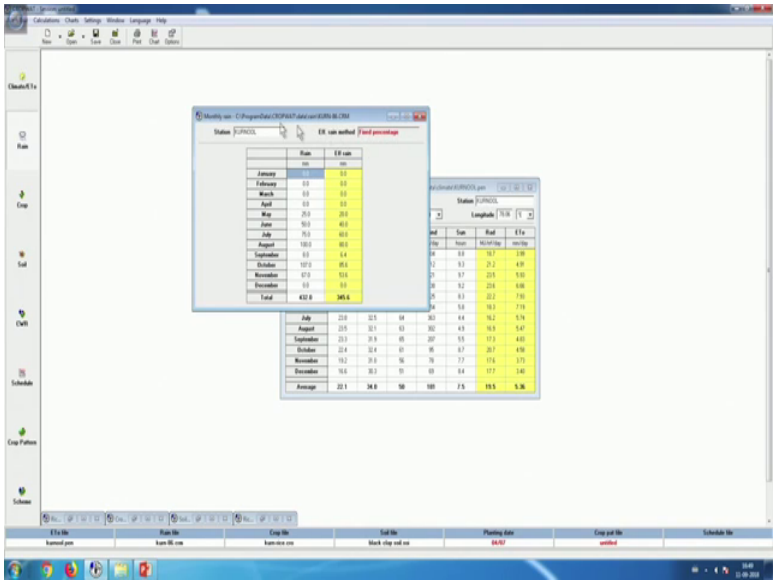

So, we can see I mean reality I have a installed it in the pc. So, if you can see how it is being used ok; so, this is the window the cropwat window for example, climate. So, this is the climate window climate parameters. So, you can open it and it is already. So, once you download and install it. So, the database is already installed in the climate folder. So, then just open it. So, it will you will give the climate data; the complete minimum max temperature and the station information and ET 0 is calculated using the Penman-Monteith methods. You can also check the different methods like options go to the options and there ET Penman-Monteith; there is another ET calculated from temperature data and other things and temperature minimum maximum. You can also average temperature all this thing you can change ok.

So, and then go to the next input that is a rain ok. So, this is the rain, I just open it. So, there is a kurnool right K kurn 86; you can open it. So, you will get this there are some other stations also you can get the rainfall data for other stations. Then this is the fixed percentage, you can change that fixed percentage values here fixed percentage or you can dependable rain FAO empirical formulas; you can change, you know several things here.

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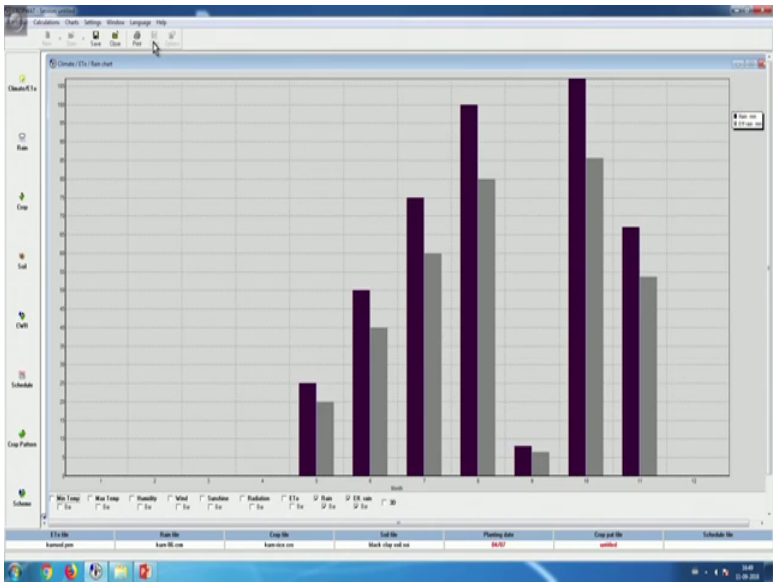

And there is a chart, you can open the chart and get the you know the rainfall here rain and effective rain; so, based on the fixed percentage. And then a third input is the crop.

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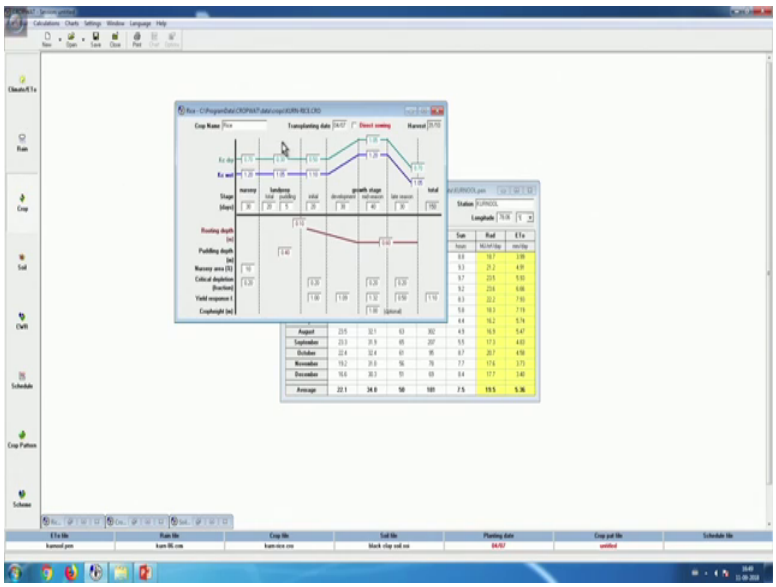

So, the crop really requires the information on K c right and a stage root depth and everything. So, this is also you can get from you know this is for rice right kurnool rice, then open it. So, it will give the crop data for rice and then go to the soil. So, the soil information also you can get from the soils folder which is already available. Let us say, black clay soil and you get the information for the black clay soils here ok.

So, then now the crop water requirement can be estimated using this data look; 1, 2, 3, 4. So, using the 4 inputs like climate rain and crop and soil you can estimate crop water requirement.

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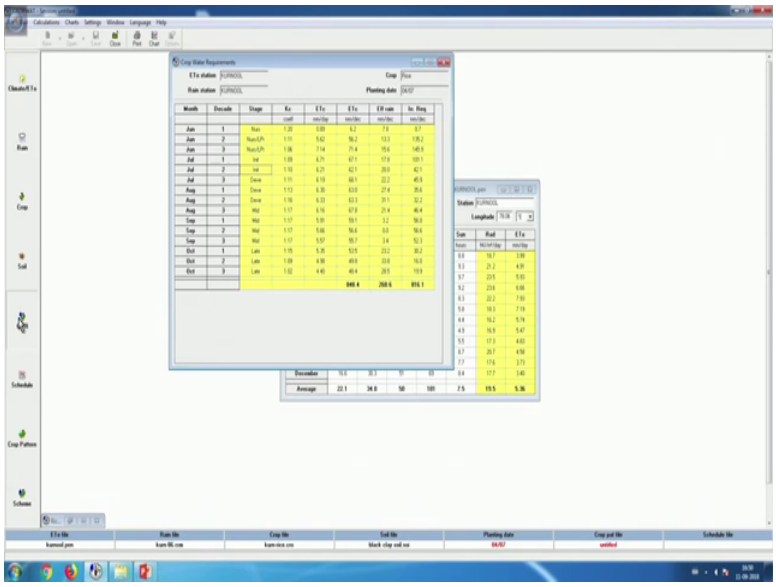

So, this is the crop water requirement for the particular rice crop. This is the first decade like a first 10 days, second 10 days, third 10 days in June month and this is nursery stage and all these thing and K c value ET c ET c all other values are given ok.

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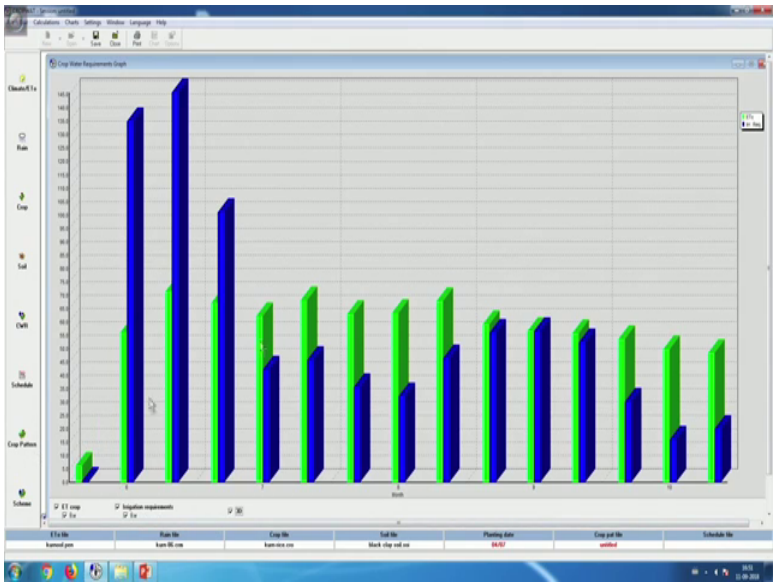

So, now, you can also click chart to see right. Now this is showing irrigation requirement in each month or each decade you can say decade in a month. You can also click ET crop there is a line which is going its showing the ET crop and then you can also see the bar values ET; ET crop bar values let us see the 3D. So, 3D views you can also see ok. So, let me close these right and now the schedule.

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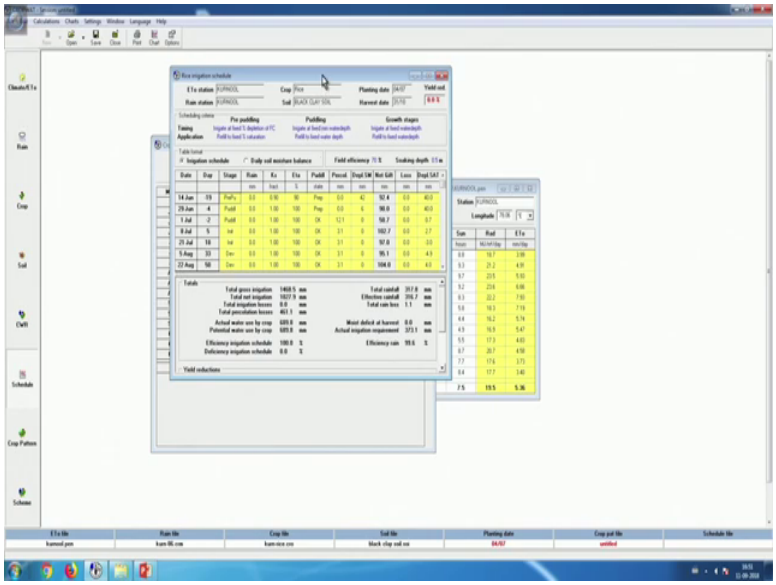

So, the schedule will give the now when to give irrigation, how much to give irrigation. So, this is the schedule I mean this is a fixed window, you cannot change this maybe you can you cannot increase the size also this one ok. So, date day stage rain and all information's as total gross irrigation, total net irrigation, total irrigation losses total precipitation losses actual water used by crop and potentially use by crop, efficient irrigation schedule 100 percent. So, all information you can get from the irrigation scheduling window.

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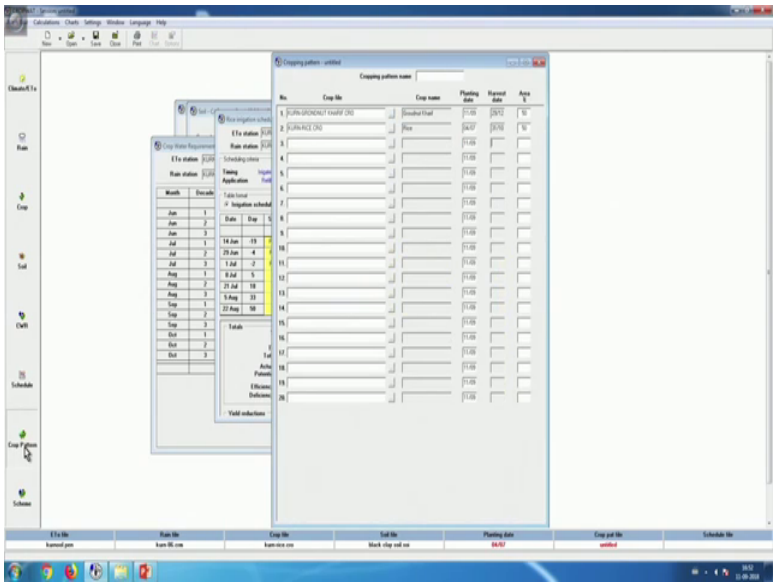

Now, crop pattern; so, crop pattern is the input. So, for example, you have 2 crops we have grown in the area. So, you can also change the crops here right. So, click there is a button at the end. So, you can choose the there is a number of crops available you can choose that and similarly the second crop this is the rice right.

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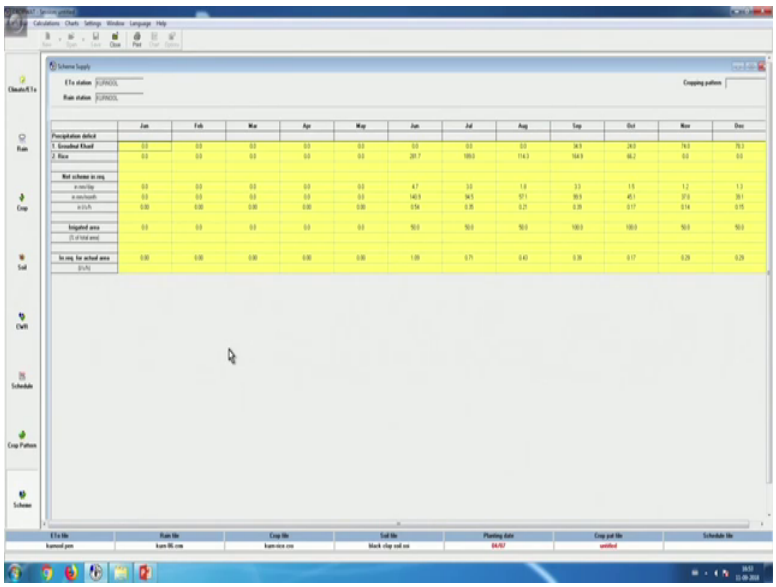

Now once you input this, you can go for the scheme. So, the scheme supply; so, will give so, this is ground nut Kharif and rice ok. So, you can see the June to July. So, all the value like this is a precipitation deficit and net scheme irrigation requirement in mm per

day. So, irrigation requirement mm per day all and irrigation area 50, 50 and September 150 and 100 ok so, irrigation requirement actual area is given. So, this way you can get the information for multiple crops. So, this is very useful software, you can download it and play with it using the existing data or if we have some data to analyze irrigation requirement or crop water requirement and irrigation scheduling. So, this is definitely a very good tool to apply in on form irrigation planning and management. And you know no and no now yeah that is it.

So thank you so much.