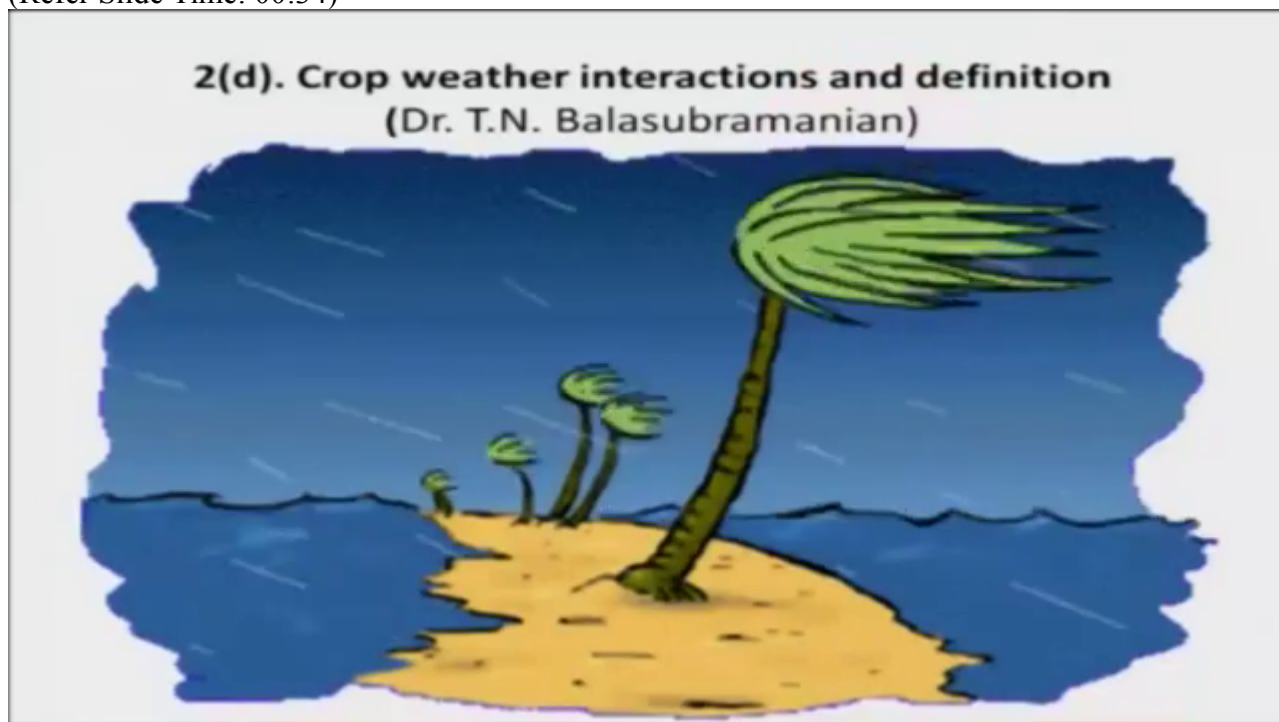


agMOOCs
Crop-weather interactions and definition
T.N. Balasubramanian

In the last class we had a discussion on the crop production risk and weather sensitiveness. These are all output from what? So for deriving those information we must understand the crop weather interaction.

(Refer Slide Time: 00:34)



In a family of wife and husband there must be a interaction between these two then only the family would be sustainable, must be positive interaction. Like that the crop is a biological component. The weather is a physical component. Both are different in the case of a family life both are biological. Here physical interacts with by organisms. So interaction is something different. Those must be known earlier so that crop sensitiveness and production risk would be addressed very correctly for developing a better agro advisories and those things we will be discussing in this class.

(Refer Slide Time: 01:20)

Crop – Weather Interaction- what is that?

- Climate influences the distribution of crops over different regions of the world, while weather influences crop production and productivity
- Crop yields are the integrated result of environmental and physiological processes that occur during crop growing period
- The environment is the climate which regulates and determines the growth and development and final output of crops
- The weather induced variability in crop yield is as high as 50 per cent(WMO)

So crop weather interaction what is that, I have raised a question. Climate influence the distribution of crops over different regions of the world while weather influences the crop production and productivity. This we had discussed earlier very very well. Then the crop yields or the integrated result of environmental and physiological process that occur during crop growing period.

Here I say is the physiological process of the crop land, physiological means you are -- the food production that is photosynthesis, flowering, everything is controlled by your environmental factors. Environment is nothing but climate or whether plus soil also, something says that if you talk about anybody it also must address your soil or regional component also. But here I am taking only environments means the weather and climate and it has got good impact or better impact on the physiological process that happened in a planned system or crop system.

The environment is the climate which regulates and determines the growth and development and final output of the crops, very very important. The weather induces variability and crop yield is high as 50% WMO, World Meteorology Organization. These we have discussed already in the crop production risk. What I want to say is there is positive interaction, there is a negative interaction between these two fellows I give life to your climate or weather and also another life to the plant system also.

(Refer Slide Time: 03:02)

Crop – Weather Interaction- what is that?

- Crop weather interaction can be called in the other way as bio- physical interaction
- The action is given by physical matter like weather and the plant as bio-organism respond to the action in a positive way if the action is favorable or on the other side negatively if the action is unfavorable.

Now see crop weather interaction, what is that? Crop weather interaction can be called in the other way as biophysical interaction as I indicated here, bio means to plant, physical means of a climate. The action is given by physical matter like weather and the plant as a bio organism respond to the action in your positive way if the action is favorable or on the other way negative if the action is unfavourable. When the action is favourable positive interaction. When the action is not favourable it is negative interaction and those things we could see in the next slide.

(Refer Slide Time: 03:42)

Types of interaction

- Positive- direct
- Positive indirect
- Negative-direct
- Negative-indirect

So I have given four interaction; permutation combination of direct, indirect positive and negative. So positive direct action of climate or weather on crops, positive and indirect

impact on plant by the climate, negative direct on the plant by the climate or weather, negative indirect impact on the crop from the weather or climate. Let us see what are those? Now examples I have given.
(Refer Slide Time: 04:16)

Examples for four interactions

Name of the crop-weather interaction	Example
Positive direct	Plant growth, Crops yield increase
Positive indirect	Enzyme action,, less pest and disease
Negative direct	Crops yield decline
Negative indirect	Pest and disease epidemic

Now examples I have given. Positive direct plant growth. I can say crop yield increase. When the weather is favourable yield is more against 20% more 30% more, you can that the weather is good, weather was good during the season, good rainfall, good temperature. So it is a direct impact on the crop production. Positive indirect in same action, less percentages and same action, within the plant it happens. We do not know what is going inside of the plant system. This is indirectly affected and less percentage – this is also an example.

And overall negative direct effective crop yield decline opposite to positive direct, crop yield is lost. Drought, crop is lost. Flood drought is lost. Probably yield is lost. Normal code it is a positive interact. So if you take three weather codes your normal weather code is giving you positive directed, your flood situation on the drought is always giving you negative direct effect. For example this we had discussed earlier in our lessons. Negative indirect pest and disease epidemic, epidemic means suddenly there is the incidence of pest or disease. So this happens always in some part of all countries at different seasons. Now response of crops to weather elements that must be understood; this also we had discussed in the first week when we were discussing about the weather elements, radiation, radiation comes from Sun directly that we called as a radiation. That is shortwave radiation directly comes from the Sun. It is -- if you want to define this sort radiation in micron, 0.4 micron to 0.7 micron.

So with receipt of these visible lights we can all say visible light. The dream and production is increased through net higher photosynthesis by the plant, light, short day plant, long day plant, day neutrals photoperiodism. So there are short day plants, there are long day plant, there are day neutrals and phototropism. So it is a adaptation capacity based on the light and

the plant has different capacity. It is a good interaction. The rainfall soil moisture and transport of nutrients and planted irritate. Seeing 80% of human body contains moisture, if 80% of the plant weeds contains, otherwise its no turgidity. So rainfall is very very important, whether it is from ground water or through rainfall. Rainfall is the direct ground water, is indirect from rainfall.

Temperature, same in the hormone activity and plants self division, multiplication and all biochemical relations, respiration, translocation and of synthates. Here respiration is very very important. I can relate to a temperature. If the night temperature is more than the optimum then there is production loss. Normally in a particular area the night temperature would be around 24 to 25 degree temperature, that is minimum temperature. The temperature is 30 degree centigrade, the synthates that was stored in the morning or before the stages will be used to make respiration, so it's a loss. So temperature has got both the direct and indirect effect. Relative humidity already we have discussed outbreak of disease, first epidemics under enough soil moisture, high RH it triggers higher growth and more flowering, especially for C4 plants as we discussed earlier. Do you require a loss of darker of leaves, reduced the transpiration with the soil moisture saving do is very very important for your residual crop management that is the trap crop or something else. So north India have bengal gram and other crops are being grown as if a residue drop. So far that dew is very very important to meet their moisture requirement.

Wind as we discussed earlier preventing first CO₂ by horizontal moment of photosynthesis. What I'd like to say is each weather element has important role on leave or crops. Suppose radiation, see it helps for dry matter production through photosynthesis. See I was telling about rice, crop interaction. When the cloud environment exist at the time of flowering of rice to harvest then your dry matter production your rice grain majority will be reduced, its development will be reduced and you are going to get reduced again. So for example you take radiation, positive impact is a dry matter production through higher photosynthesis.

If the higher radiation does not occur what will happen, the product will be lost, not for example, I can take it from rice. The radiation is not available from flowering to our maturity milking stage and before 10 days before harvest, Physiological majority that isn't, does not occur. Then there will be yield loss. Only the radiation does not occur because of the cloudiness

Clouds may block , your radiation being received from (inaudible 00:09:42) your crops. So this is a good example. Like that for all other elements I have given the response of the crops, if these are blocked I think the yield is going to be affected, that is a message to be message to be obtained from this class. Thank you very much.