Introduction to Ancient Indian Technology
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Module 2
Lecture No 10

Let us start this lecture with thought process that all of you here are to learn right learning is a process and we should have love for learning. So I always feel that love for learning lessens the labor pains of learning. Today learning is a very difficult process for all of you right. Because you people are occupied with several other things and therefore it is very important that you should develop love for it and learning is a part and parcel of human life.

Let us recall what we learnt in the last lecture. We basically looked at that why we need to go for agriculture as a basis for our growth, right and why because you know like we are having naturally endowed with the resources which are very conducive and you know for the agriculture or for the farm and later on we looked at that like what are the processes involved in agriculture and how this modern agriculture being implemented as of now, right.

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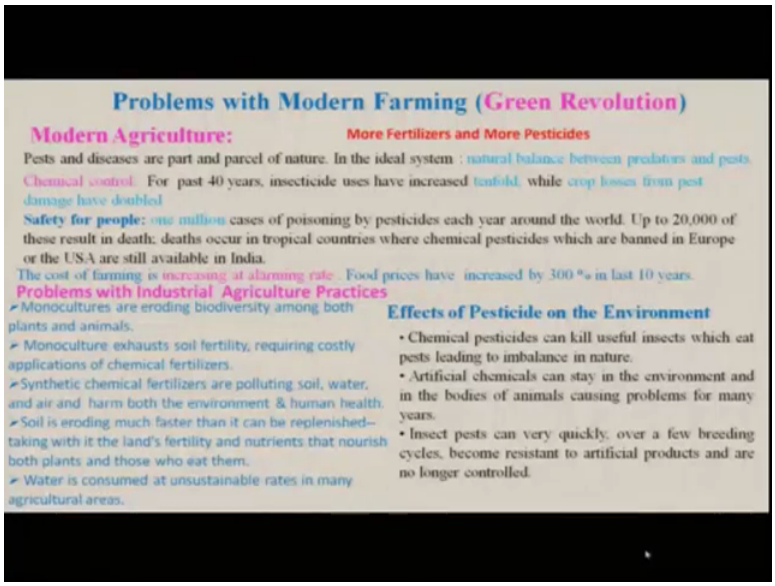

And today we will be looking at what are the problems we are facing with the modern farming and you know like in nineteen Fifties or the sixties you know like we are having green revolution. People are very much where gaga about it and today also some of the, you know

intellectuals are very saying that we need to go for second green revolution. Is it really revolution or not that we will see and I will I will put forward or I will show you Some data to it, but let us before that let us look at what are the problem in them modern agriculture.

We use more fertilizers and more pesticides. For what? Because more fertilizers will give the growth will be better and then you know production of the crop will be high and more pesticide we will have to give because the pest or the are more increasing at a number because as a result that we are more profit maniac like you know we are want to have more greedy greed greediness has come to our mind too much right and there is a whole world not only in India and across because of this is what you call mentalism like I told earlier market mentalism makes the man maniac.

So we became maniac know like profit and for grabbing all those things are going on in our mind that is a dead what you call deterioration of mind power to think which is right which is wrong getting swayed away. Therefore that is the problem and then it is trust upon us and we are just not thinking about it. Then pest and diseases are part and parcel of nature. Keep in mind that because one person will be relying on other. Right and they balance and so also disease is the thing to decay and you will be going. This is the part of nature.

In ideal system natural balance between predators and pests are to be maintained so you know each are connected with each other. These are all philosophy what our embedded in our you know Traditional knowledge system in our ancient is done and which we need to understand basic things what we are talking about here you need to understand the basic laws of nature and then work accordingly and not going against and you know unbalancing or doing something that balance will be broken.

Balance is important because we cannot really look at and only small micro management. The whole big picture we need to look at it and big picture are very order and then it may be looking like a disorder but actually as I told that our civilization in order in disorder and that is natural. So that has to be looked at. So chemical control that is why we want to have a control over this diseases and also the pests so that last 40 years you know insecticides use has been increased tenfold. While the crop losses from the pest damage have doubled.

Loses are increasing and you are increasing that also like insecticides so one has to look at that why it is so and as a result the safety of the people. One million cases of poisoning by pesticide each year around the world and up to Twenty thousand of these results in debt this poisoning because of this number may be more I mean like you know and dates occur in tropical countries where chemical pesticides which are banned in Europe and other Western countries like USA or steel being used in India.

Right, I mean there are several examples I am not going to look at it and you can see your… For example DDT and some other thing when you are people are not use but we are using here in this country. So and cost of the farming increasing at alarming rate and as a result food prices are also being increased very much around 300% in the last 10 years and if you look at we are having people who are hands to mouth meaning like hands to mouth laborers and where they will get the food. Because the food price are now are comparable to the globally global market and earlier days food was very cheaper in this country.

Whenever I visit other country I feel oh we are safe we are having at least food. A common person can get. Today it is not because of globalization and you know and problem with the industrial agricultural practice here I have already discussed let me just highlight some of the points since I will be highlighting more again because I want that some of the things will be repeated nature but keep in mind these are important.

We need to understand that then only we can take correct step. As I told that mono cultures basically the single kind of crop they use and that erodes the bio diversity among both plants and animals. It is not only with the plants only because all are connected. So therefore that is creating and if you look at the nature is always multi-layer or various things you know it is not a heterogeneous, it is not homogeneous.

We are trying to make it homogeneous because in engineering we do that you know but that is not ha! That is a wrong it is not a easier to handle the heterogeneous thing you make it homogenous therefore you say that no nature is other way around. It is your limitation that you are trying to push forward or the trust upon the people but you must understand that nature is not like that. And there is a strength in that synthetic chemical fertilizers are being used blatantly

which pollute the soil not only the soil, water and air and whatever the environment we are getting spoilt because of the blatant use of chemical fertilizers.

I will be showing how it is so and both environment and although not only the human health but also the animal health, plant health. If all are being connected so soil which is the soul of infinite lives, right, and that is getting spoilt you know much faster than it can be replenished. And taking with its lands fertility whatever the fertility nutrients the land the soil is having it is going away and whichever important this fertility and nutrients are very important for the growth of the plants and those things we eat as a food. But those are being getting away you know.

I will be showing you later on like what are the things and I will also give data how this most of the civilization got extinguished, got spoilt because of soil quality is going down at that time. We need to keep that maybe in the next class I will show you some data. And water is consumed at an unsustainable rate it is in many agricultural areas because water is being used too much and it is also helping to take away or leaching out the, what you call this fertility and nutrients which you are adding to the soil artificially and also the natural one. All are going away so you know you are using because of too much use of water.

So effect of pesticides on an environment if you look at chemical pesticide can kill useful insects. There are a lot of microorganisms, insects are very useful. Pollination, for pollination you need but they are not you know. And for if pollination will not be there you cannot have a food production. You may have very big plants but you do not have and nowadays in western countries people are using artificial pollination. You know like why you will do that and cost will be increasing which led the pest leading to the unbalancing nature and the whole mother nature in imbalanced.

You are cutting the limbs; fingers of the you know if you look at the body my fingers have been cut. My you know hand being removed from the mother nature, you know mother nature if you consider as a body. That is not the way. So therefore you need to look at it and as I told earlier artificial chemical can stay in an environment in the bodies for a number of years. Right, even if you want to use it will stay for you in the earthling for generation to generation and you cannot really afford to do that and causing problems for many years. It is not for your generation it is for

the next maybe five ten generation will have to suffer because of you have used the chemical fertilizers and which are not good for the health.

So therefore we need to understand insect pest are very quickly or over a period of breeding cycle they become resistant to artificial products. They also try to resist the things and develop hormones and other thing for that they can. Because that is the nature, nature is intelligent you know. They are working to grow. If somebody will try to hit you, you will have to protect yourself right. Find out who is on means. Use your mind, use your body, use your resources, use your power to do that. They are also doing that way. Ok and are no longer controlled by the label of chemicals what you were using earlier days.

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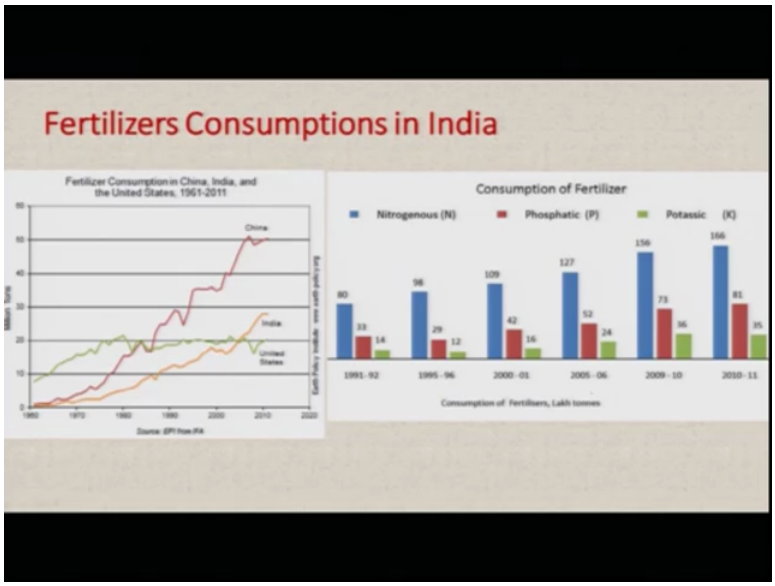

I will be showing you some data as well. So if you look at fertilizer consumptions you look at this. In 1960 we are having fertilizer consumption and is very very low. If you look at this is the color orange color. The line is very very low million tons. Very you know like one or two million tons and it is goes on increasing. And so also China and then we are because we want to grow at a faster rate than the other people and that is the bigger problem. But If you look at America which is very intelligent people you know like they have grown this higher increase from 1960 to maybe 80 there is realized that this is not good and they are all must remaining constant and sometimes going negative and I do not know the data last maybe six seven years but I am sure that they might have decreased it.

So if you look at we need to do that. We will have to cut off and then the whole business you know they are sending their multinational companies to here to use us and spoil. Who will be intelligent you know we have to understand this and do that. So and if you look at we are as we are using more fertilizers and more pesticides and other things we are spoiling also the ground water. I was told of course this may not be the correct but you please check and do not go by any data I am giving. Please correct check it and then accept it.

In some newspaper this thing I learnt that 60% of ground water in China are not drinkable. In India you think about it. My guess is around maybe 20 to 25% and at least in Kanpur I know there is a some area where the water has gone ground water has gone bad, deadly bad. So therefore we need to and worry about that because that sustain the life and if we spoil the ground water and which are inter connected how we are going to what you call correct it or how we are going to replenish how you will do that. Can you take it out the pump and again put it. Is it possible all are connected you know like interconnected. Right, so how you will you know take care of that polluted water so therefore we will have to be worry about.

And if you look at the fertilizer consumption and nitrogen there is a phosphatic type, potassic type. These are all increasing you know in 1991 we are something 80 in lakhs tons you know. This is in lakhs of tons, 80 lakhs tons and in 2007, 166 and today maybe it will be something 175 or maybe 80 I do not know. Ok you please look at it. They all are increasing. We should decrease it or it at least stabilize it you know because we know it is they are harmful but still because our people are illiterate and so also the thing and the people are using advertisement and other thing to what you call leave them for this for more production and more profit as a tool to imbibe them or leave them all our we are spoiling the health.

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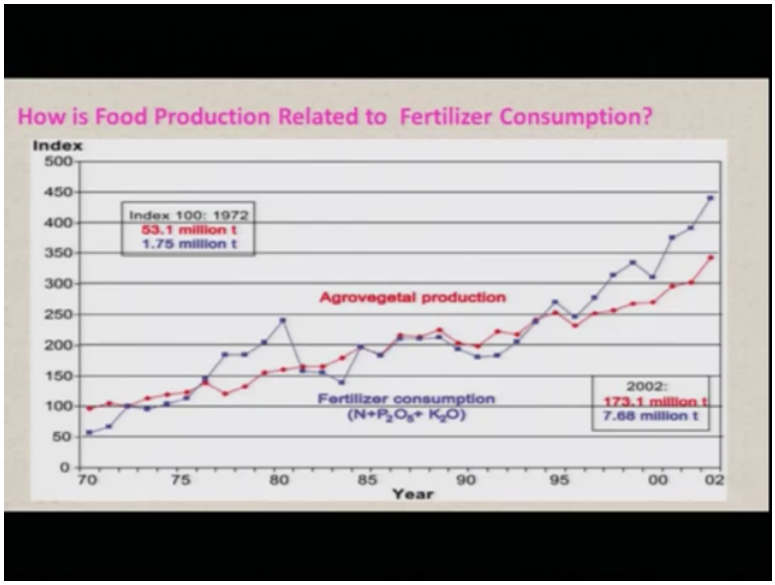

Let us look at how is the food production related to fertilizer consumptions. Right. So if you look at this is I have taken the data from 72 to 2002 is the little old data but let us look at the trend. This blue color fertilizer consumption rate it is going up sometimes it in 75 it is gone up above the red line that is corresponding to the million tons of the food production. And then if we look at it is food production is lower down at least 95 onwards and the fertilizer consumption is increasing and let me tell you last year I had gone to some nearby village in Kanpur where people are you know and then I enquired with the farmers and I told them what are the consumption.

They are saying that we are using almost double the fertilizers what we are using 10 years back for getting the same you know tonnage for acre kind of a crop. Look at what we are doing that means the soil fertility has been gone down and you are adding more and more and then it will be spoiling. Right, so therefore the farmer is committing suicide because the cost of farming is increasing at an alarming rate than the what price they can get in the in the you know what to call market.

As a result you know they are in debt. Therefore government of India is you know what you call taking away the debt in the sense giving the what you call subsidy, not subsidies it is cancel like waving of loans waving of loans. Their waving of the loans but that is not the solutions. Solution has to be found out looking at what are the causes of it and then look at fundamentally and solve

the problem and there all of you who are listening to this lectures and then you will have to come into picture and educate them and also educate the government about this wrong policies of using this concepts because we are democracy we should do that.

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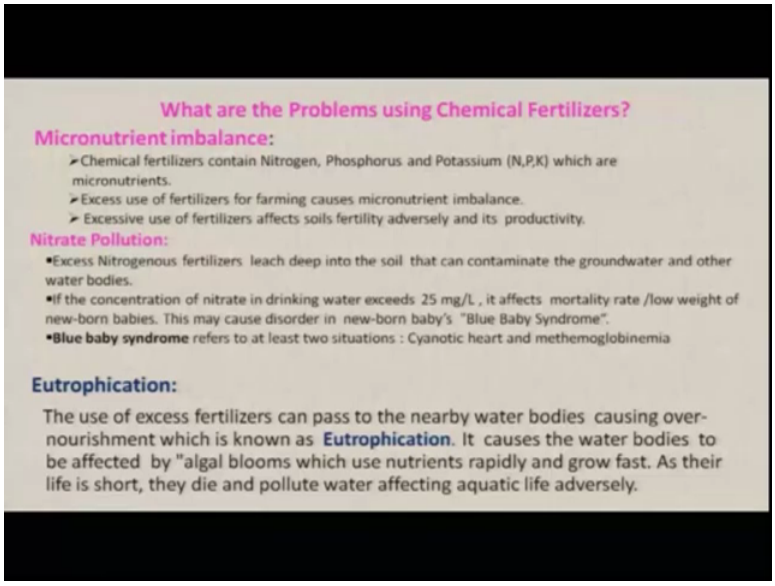

And the growth is and we are all talking about green revolutions and other things and we want to have a another green revolution. People are talking about genetically modified crops and I am afraid one should not venture to that. Of course there are several reason I will not be talking about why you need to but you will have to if you are interested get into that and find it out yourself. So the growth rate of the crop production let us look at. What happened in our the green revolution. Let us look at that this 1,2,3,4,5,6,7 in this diagram for the wheat. We are talking about pre green revolution something 1951 to 1968 we are having something 37 you know is the tons of this. So eh… this I have taken the data from the draft of twelve plan document, daily planning commission in 2013.

Right, so let us say this is the percentage you know what you are having then it has been decreased in the green revolution period 69 to 81. Ok and then again it is little bit increase up and going down and then down and this thing again people are increasing because of in the seventh plan. And that is true with if you look at this point for the rice for the wheat and then for pulses, for oil seeds. Of course oil seed has little bit gone up. I mean corresponding to this 1951 and and

in today kind today means eleven twelve. But wheat and rice and pulses you know it is lower than that what it was there previous thing.

So therefore you can judge from yourself and this data I have taken from this thing that look this is a myth that we are having a green revolution. Ok because the crop we are putting lot of pesticide, lot of fertilizer and but this thing we are not growing I mean like we are like various fluctuations depending upon your what you call... your climate and it is depending upon other parameters you know that is there.

So one has to look at data and analyze it and then only we can say that look there is a green. Beside this we are paying price for the what for the use of this chemicals, fertilizer, pesticides, spoiling soil, air and that thing. We will be talking about the problems of chemical fertilizer. Let us understand that and there is a micro nutrient imbalance because of utilizing the chemical fertilizers. Because we know that chemical fertilizers contain nitrogen, phosphorus, potassium which are micro nutrient.

These are the micro nutrients you know you can think of and excess use of fertilizers during the farming causes micro nutrient imbalance because the soil you are giving artificially. For giving artificially you know soil will be imbalance. Maybe you are adding more than what is required. So excess of anything is bad. Right, you need to know that what are the things. And they will be also imbalance because of root we will be taking and then it will be not taking all the things. It will be remaining.

I will be talking about later on about like root how they take and what will be the size of roots if we use chemical fertilizer if we use natural farming. All those things I will be talking about little bit later on particularly when I will be going to the natural farming. Excess is the affect the soil fertility adversely and also the productivity as I told just now that the with my own experience we were talking with the farmers in the nearby Kanpur area. They are saying they are using large number of you know large amount of fertilizer for the same amount of crop production in the same land.

Right over the years and that is true you can see and you can ask anybody and you are also having data nowadays internet you can get the data and maybe from reliable source because internet one has to be careful about data. You can go to the government sources, some other

things you can find it out. What are the consumptions you know I have shown you earlier. So there is a nitrate pollution like excess nitrogen nitrogenous fertilizer leach deep into the soil because you are using lot of water also.

Irrigation you know like and there is a ground water you are using the pump you know the power. Right, electricity and the diesel and lift irrigation system now has come up. You press the button and the water will be spread this thing. And it is sometimes I have seen at least in the nearby Kanpur area that is they use lot of water unnecessarily and that can contaminate the ground water also. And that is happening in lot of areas and other water body is nearby is getting spoilt.

You know nitroces fertilizer and if the concentration of nitrate in the drinking water exceeds 25 milligram per liters it affects motility rate and the low weight of the new born babies which is basically these are you know low weight and a thing known as a blue baby syndromes. Right and which is showing and I will show diagram maybe next slides that and blue baby syndrome refers to at least two situations one is Cyanotic heart means you know there will be arteries which will be thicker and thinner that problem will be there and this methemoglobinemia that means like a anemia you know like blood will be less and now it will be little bit different than that this causes problem in the blood itself.

So you can look at this term. I am not sure about that but you look at that. So what is that. I mean this is causing problem which will be with the baby itself. Then you know where you will go. Right, so these are very serious problem of the blue baby syndromes and there is another problem which comes eutrophication. Eutrophication basically when you use excess fertilizer that can pass to the nearby water bodies. Ok, and as a result there will be over nourishments in this pond water bodies and which is known as eutrophication.

Because the over nourishment, if over nourishment will be there then what will happen that the algae you know there will be lot of growth in algae at faster rate. And then they will grow very rapidly. Right, then again they will die. And as a result because their life is short and they die and pollute the water affecting the aquatic life adversely. That you might have seen, that in your you know observation if you are having good observation. See the cause is this one, so therefore this causes and that is the problem.

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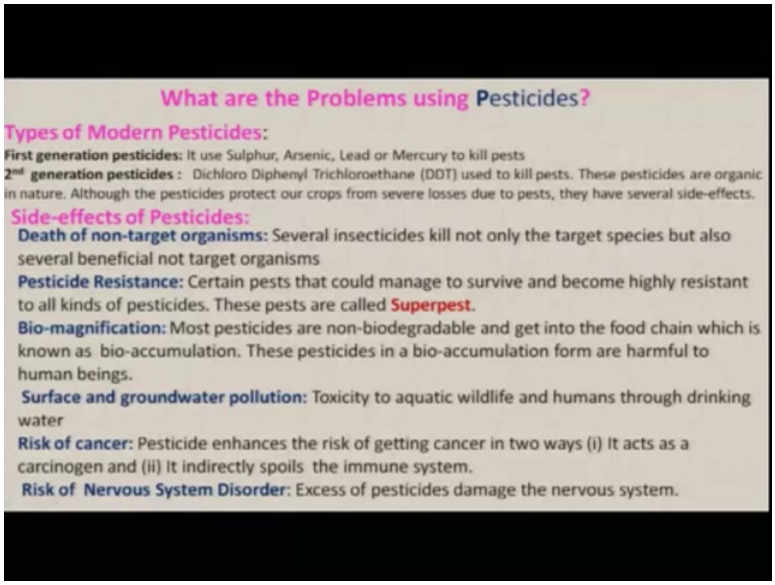

If you look at this pesticide there are two kinds of pesticide people use. Fast generation pesticide use Sulphur, arsenic, lead and mercury to kill pests. Look at this these are all dangerous one should not add it but we are using. The second generation is of course the DDT the Dichloro Diphenyl Trichloroethane which is used to kill pests and these pesticides are organic nature. Of course but pesticide protects our crop from severe loss due to pests but they have several side effects you know can think of they have several side effects.

They should not be used as such and side effects of pesticides as I told that basically they are non-target organisms. Suppose you want to kill X but now you will be killing Y Z and other things and which are beneficial. So several insecticide kill not only the target pests but also the several beneficial and organism which are not of target. And as I told that after you know you use this pests several times the people those are also living organisms. They try to resist and certain pests and of course certain things may not resist properly but certain pests that could manage to survive became highly resistance to all kinds of pesticides.

You know these pests are called as super pests like superman you know they became super pests. So and bio magnifications is another thing most pesticide are non-biodegradable. Right, it cannot be degraded by the soil or other things. So get into food chain which is known as bio accumulation. It will be getting accumulated and these pesticides in bio accumulation form are harmful to the human being and as I told it will remain for your body chain you know chain food

chain for several time also in your own body. Right and it will be transmitted you know various pumps.

And surface and ground water pollution you know like toxicity to aquatic wild life and human through drinking water. Right all those things. Risk of cancers like pesticides enhances the risk of getting cancers in two ways. It acts as a carcinogen also and it indirectly spoil the human system. You might be aware that there is a train known as cancer train which is originated from Punjab. You are aware all of you. In the train all cancer patient will be coming you know. That is why people call it cancer train because in Punjab Haryana region they are using this pesticides and fertilizers to a larger extent.

They can say like the rice wheat bowl or the food bowl of India but they are really spoiling their own health and giving us food and that is also not good quality. So I will stop over here and we will be looking at the what you call disadvantages of the or the use in this modern farming I the next lecture and later on I will tell about like what is the quality of food we are using and then we will be looking at basically why we need to go for the ancient technology for the agriculture.

Thank you very much.