Organic Farming for Sustainable Agricultural Production

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Lecture - 34
Natural Sources of Antioxidants for Health Defense

So, welcome to lecture 34 that is the Natural Sources of Antioxidants for Health Defense. So, as you see in previous lectures, we are discussing about the quality of organic foods and somehow we have focused towards the secondary metabolites because if you see the quality of organic foods, that means the food quality as in general the food quality because of higher content of secondary metabolites in organic foods. And that is what is needed for the defense mechanism to fight against many diseases in the human health.

So, that lecture is natural sources of antioxidants for health defense means the antioxidants, they can fight against the many diseases like cancer, the cancer diseases and this is the how the organic foods have the higher content of antioxidants. And what are the natural sources means because the body the natural sources can be you can have regularly natural sources of antioxidants, so that you can keep your body fit or you can avoid so many crohn's disease.

So, this we will discuss in this lecture about the natural sources of antioxidants for the health defense.

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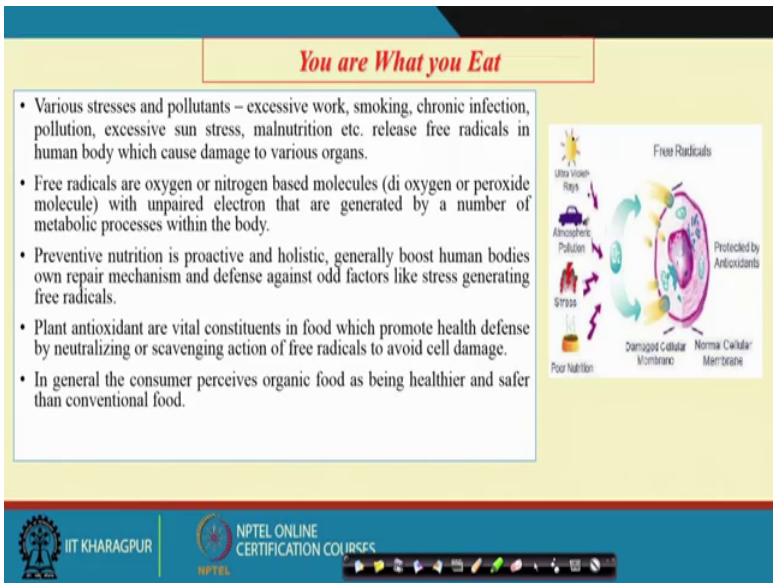

So, you can see what you eat, that means your body means say is yourself your body is yours and you need to manage your body and because managing your body, keeping your body fit, the food has an important, very significant role in keeping you fit in addition to other many other things are there. But the what you take, what you daily intake that regulates to that, leads to defining the health status; how you can maintain your health through your food.

So, that is various stresses and the pollutants because either you can go for the excessive work or the smoking chronic infections or the pollutions, excessive some stress and malnutrition. That is a poor nutritional foods release free radicals in human body which cause damage to various organs. That means, if you see this figure. So that is a stress comes from the pollutions or the excessive some stress or the stresses, but either the mental stress may be sometimes go for the depression or the work pressure, excessive work that comes a mental stress or may be poor nutrition, the food you are eating, the poor nutritions. So, those things, they causes or they favor the formation of free radicals in human body.

So, there is free radicals means the unpaired electrons such as reactive compounds are formed the human body. So, once there is a formation of free radicals, so they do make cell damage, so that they damaged cell. So, due to formation of free radicals, they do cause cell damage, and this is a normal cell, and the damage cell due to the regular or the formation of free radicals. But if you have the antioxidants or antioxidant means they do neutralize the free radicals, they do donate the electrons, so that they can have a scavenging effect on the free radicals. So, they make them there is an inert unreactive. The compounds can become unreactive, less reactive by having anti-oxidants. When you apply when you the take regularly anti-oxidants, then your cell can be feel that, can remain free from the free radicals damage that can be healthy cells. So, that is what.

So, if there is a damage of cells slowly and slowly, so it may happen after accumulation. So, that leads to mainly cancer diseases due to the damage of the free radicals the causing the cell damage. To protect this we should have the anti-oxidant. So, mostly how can we the anti-oxidant means the free radicals are oxygen or nitrogen based molecules with unpaired electron that are generated by a number of metabolic process within the body as you see.

So, these free radicals are generated in the body. Preventive nutrition is proactive and holistic generally boost human body own repair mechanism and defense against hot factors like stress generating free radical; so in our body also there enzymes. So, the enzyme they act the released they do feedback this and they do not allow the formation of free radicals itself. So, it is that we have self-defense mechanism in the body also there.

So, there some enzymes here they do fight back and that do not allow the formation of favor, the formation of the free radicals, but in addition to that we need to have an external supply of the free the anti-oxidants, so that you can neutralize, you can deactivate the free radicals. So, that is a plant antioxidants. The natural antioxidants are the vital constituent in food which promote health defense by neutralizing or scavenging the action of free radicals to avoid cell damage. So, you need to have the regular supply of the natural antioxidants by the intake of the fresh fruits and vegetables. Those are rich in antioxidants and we should have the fruits and vegetables regularly.

So, that can have a health defense and they can be neutralizing or the scavenging action of free radicals can be enhanced by having this natural antioxidant in our regular diet. In general the consumer perceives that organic foods as being healthier and safer than the conventional food because you say that organic foods that contains higher content of antioxidants as compared to the conventional foods. As you as discussed just in the last class because of stress mechanism, organic foods have the stress mechanism and supply balance nutrition including macro and micronutrients and the stress mechanism that helps the formation of secretion of phyto hormones or the phytochemicals in the plant body and those are the secondary metabolites, the higher secondary metabolites contains and those are, they have the higher antioxidant activity of these food crops and specially organic foods have the higher anti activity and having the organic foods regularly.

So, we can protect the human being from many of the health related issues and specially the disease like cancer.

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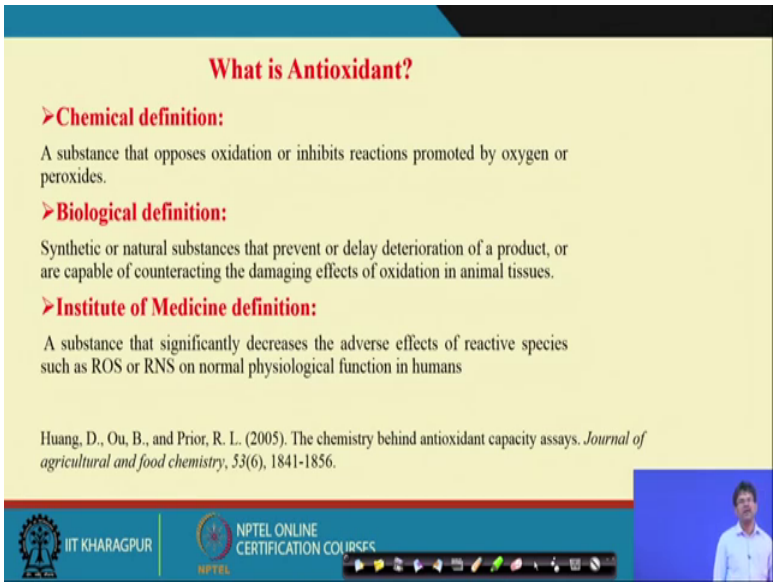

So, that means the antioxidant, the main components of because as you see the organic foods or the any the natural sources of fruits and vegetables having the higher antioxidants, so we have to have a regular intake of fruits and vegetables. So, what is that antioxidant that is required? Daily required antioxidants for the in daily intake or daily diets that is a substance that opposes oxidations or inhibits reactions promoted by oxygens or the peroxide. That means the oxidation reaction is inhibited by the anti-oxidant. There is there is no formation of free radicals because the by releasing giving the electron that that compounds becomes active reactive, very reactive compounds to make it less reactive, we have to stop the oxidations.

So, that is what is done by the chemical definition of anti-oxidants job or the biological definition says; synthetic or natural substances that prevent or delay the declaration of a product or are capable of contract in the damaging effects of oxidations in animal tissue, and Institute of medicine definition say a substance that significantly decreases the adverse effect of reactive species such as reactive oxygen species or reactive nitrogen species on normal physiological function of human. So these are the definition of anti-oxidants. So, as you take as they can neutralize the formation of they can have scavenging effect, they can stop the formation of they can limit the formation of free radicals in human body.

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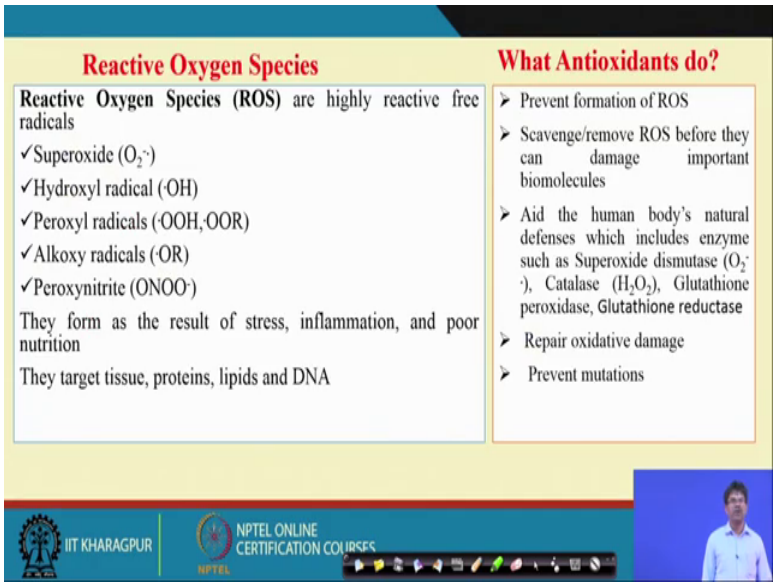

So, how do what are these reactive oxygen species? They formed the human body as regularly as you say the reason is because of the stress excessive stress, may be work stress or the mental stress is of working heavily.

So, that makes a stress in human body or you are taking the bad food, very junk foods that causes also the release of free radicals or excessive some stress. So, these are the hum diets. What diets you are taking? The bad foods you are taking? What type of the karyotype? Most of foods of foods are these high pesticide residue those type of foods you are taking. So, that causes the formation of free radical. Those have the super oxides. These are the examples of free radical; they form the human body super oxides O2 minus dot or hydroxyl radical, perapsi radicals, alkoxy radicals or peroxynitrite.

So, these are the free radicals, they form human body as a result of stress inflammations or the poor nutritions that enhances the formation of the free radicals. What they do? They do to target the tissues, proteins, lipids and DNA for these free radicals are there very active highly reactive. They are on pair, they have the unpaired electrons. So, they do make the cell damage. So, they do damage. The tissues they do damage the proteins lipids or DNA damage. Finally, they lead to get the disease like cancer. So, to contract the formation of free radicals, then we use anti-oxidants.

So, what is the job of anti-oxidants? What antio-xidants do they prevent the formation of reactive oxygen species? So, anti-oxidants they do not allow the formation of these the

free radicals, these are the reactive oxygen species, they are the free radicals. So, they cause this cell damage, they prevent formation of reactive oxygen species or inhibit the oxidation process in the body. So that the free load the free that is a free radical formation are inhibited or scavenge or remove the reactive oxygen species before they can damage the important bio molecules or that is proteins lipids and DNA.

So, before they make damage, they can they can scavenge or remove the reactive oxygen species or they eat the human body's natural defenses which includes enzyme because what you say in your human body the natural defense mechanism. So, these are the enzymes and they help, they are they are available, they are present in the body like super oxide smooth age catalase, glutathione peroxidase, and glutathione reeducates.

The job of the enzymes here, they have to control balance the formation of the free radicals. They are not allow the formation of free radicals. These enzymes and the activity of the enzymes are increased by having more and more anti-oxidants. They do help. That is human body's natural defense mechanism. They boost the natural defense mechanism repair the oxidative damage the free radicals and prevent mutations change of gin also prevented by having the antioxidants.

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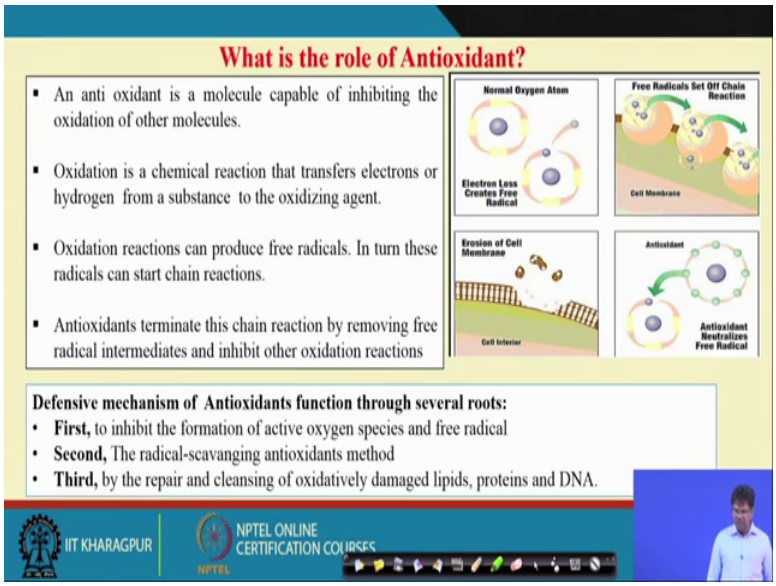

So, the thing that, so what is the role of? So, same here containing what is the role of the antioxidants and antioxidant is a molecule that is capable of inhibiting the oxidation of other. That means, that stops the oxidation process that stops, they want to stop the

formation of free radicals or the or that is compound, that unpaired formations is stopped or can be reduced in the body having antioxidants. Oxidation is a chemical reaction that transfers electrons or hydrogen from a substance to the oxidizing agent.

So, there is an oxidation reaction can produce that produces free radicals in term these radicals can start chain reaction. So, in normal oxygen atoms if there is an oxidation process say this is a electron loss and that creates free radicals, so if there is a the free radical formation takes place due to oxidations. And that is the reason you are discussed because of the stress or the bad foods or the many other reasons. There was a free radical formation takes place, then there is a free radical setup chain.

So, there is a set up chain that causes the cell damage. So, that is the erosion of the cell membranes due to the formation of these free radicals. So, antioxidants, what is the job of antioxidants? They terminate the chain reaction by removing free radicals, radical intermediates and inhibit other oxidation reaction. So, what anti oxidation they do? So, they inhibit the formation of the free radicals, so that they can protect the cells from the damage.

So, that is what the role of anti-oxidants. They do not allow the formation of, they neutralize the free radical radicals and they do not allow the formation of free radicala by these steps, defense managing of anti-oxidants functions through several roots that is first to inhibit the formation of active oxygen species and free radical. That means, the reactive oxygen species are inhibited by having anti-oxidants in the body; the second, the radical scavenging anti-oxidants methods; and third by the repair and cleansing of oxidative damaged lipids proteins and DNA.

So, that is what the role of antioxidants as you take the enzymes with defense enzymes are there in the body. So, they do not allow the formation or neutralize or the scavenging activity and the free radicals.

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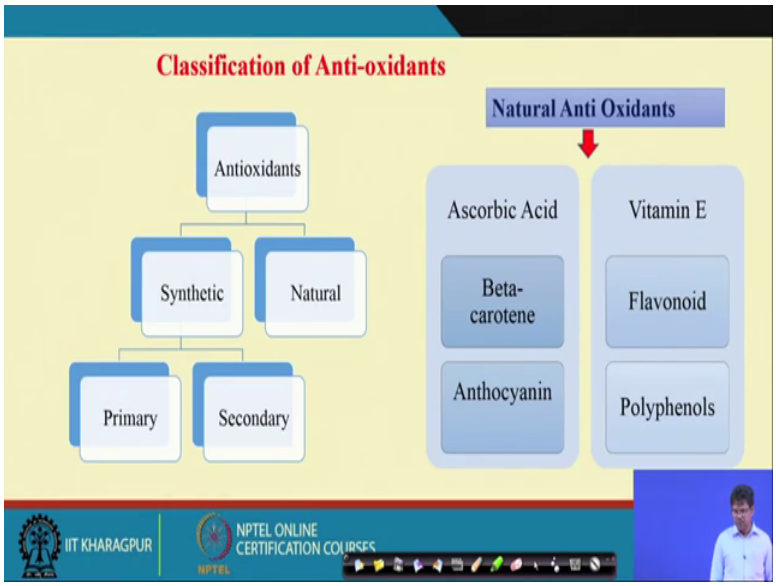

So, these are the classification of antioxidants. So, you have the synthetic or natural we have synthetic anti natural antioxidants. It is synthetic primary secondary as you are discussing the natural anti-oxidant means they are all planned origins or you can cut some of the fees and meat also.

So, those are as the natural antioxidants. So, these are the anti-oxidants ascorbic acids that is Vitamin C, Beta Carotene, Vitamin A Anthocyanin, Vitamin E, Tocopherols, Flavonoids and Polyphenols. These are the natural anti-oxidants that supplies either from the plant based products or the animal based products.

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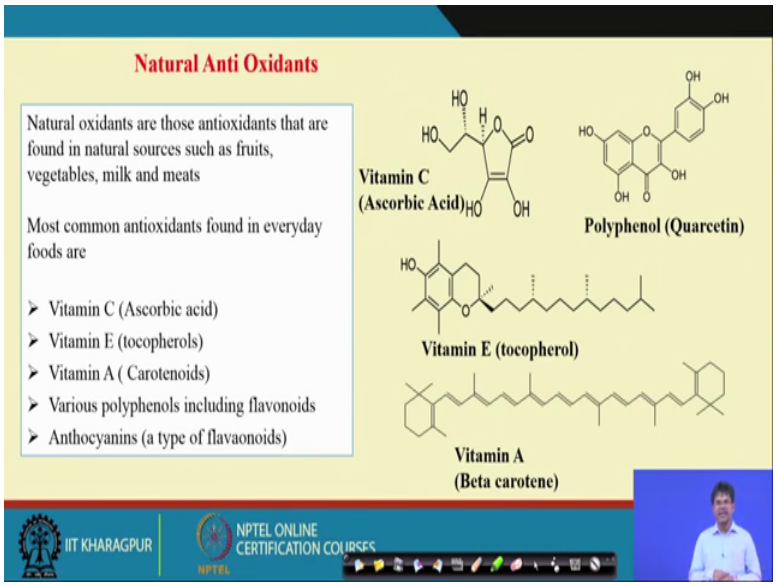

So, if you see the natural antioxidants, these are those anti-oxidants that they are they are found in natural sources such as fruits, vegetables milk and meats.

So, most common anti-oxidants are found in every day foods. That means, as you take the everyday foods as fruits, vegetables milk and meats, these are the Vitamin C that is an ascorbic acid Vitamin E; it is tocopherols, Vitamin A that is carotenes, various polyphenols including the flavonoids and the anthocyanin as type of flavonoids. So, these are the antioxidants we do take regularly in the human diet.

So, these are the structure of the antioxidants as Vitamin C, polyphenols Vitamin E and Vitamin A.

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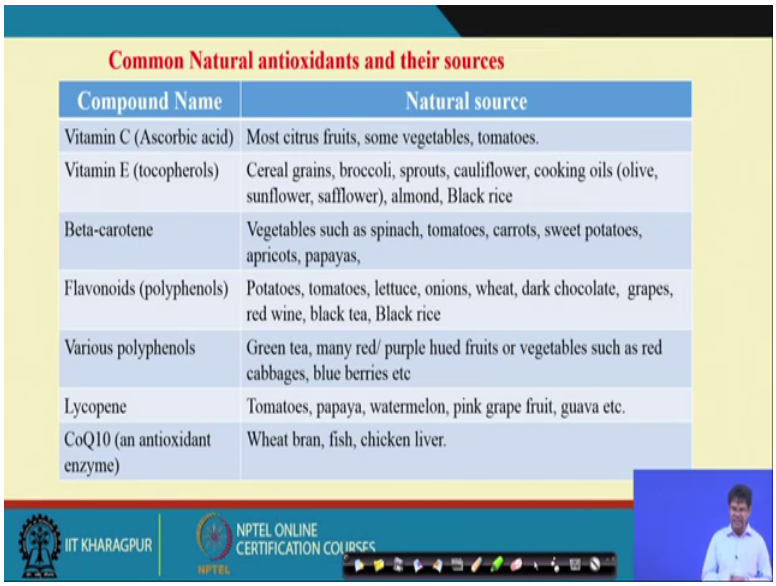

So, now we discuss the common natural anti-oxidants and their sources. So, what are antioxidant? Usually these are the left side, see these have the compound name that is anti-oxidants, and the natural sources how we can get wait type of fruits and vegetables, we can get those anti-oxidants like Vitamin C ascorbic acid.

So, the sources are mostly citrus fruits and some vegetables and tomato. They can they can supply the ascorbic acids Vitamin C and Vitamin A that comes from the, sorry Vitamin E that get tocopherol that comes from the cereal, grains, broccoli or the cauliflowers, the cooking oils, olive oil, sunflower oil or the sunflower oils, then almond and black rice. Black rice is a good source of Vitamin E. You can know that is an anthocyanin pigments of the black pigments of their, so Vitamin E that comes from the black rice too beta carotenes, vitamin A.

So this comes from vegetables such as spinach, tomato, carrots, sweet potato, then apricots and papaya that gives the better carotenes. Similarly flavonoids or the polyphenols we can get from potato, tomato, lettuce, onion wheat, dark chocolate, grapes, red wine, black tea and black rice. Also you can have the flower, the flavonoids polyphenols. Then you can have the various polyphenol compounds you can get from green tea, many red and purple fruits vegetable such as red cabbage, blue berries.

So, these are the red colored cabbage. That is a red cabbage or the blue berries. There is anthocyanin polyphenols are, they have the grate better health benefits like there many

polyphenols, they can fight backs, they do not allow the formation of the free radicals in the human body. So, lycopene that is you can get from tomato papaya water melon pink grape fruit and the guava and coenzyme Q 10. That is also an antioxidant enzyme that it that you can get from the wheat grain fish and the chicken liver.

So, these are the natural sources from where we can get the antioxidant, but you need the regular diet in regular diet. So, those this fruits or the vegetables or the milk produce or the fish that can be included in the regular diet, so that you can get the regular supply of natural anti-oxidants. They can fight, they can have defense; they can increase the defense mechanism of the human body. So, think of that. So, how can you consume? The consumption also depends upon how you are consuming the anti-oxidants, so that it can increase the defense mechanisms.

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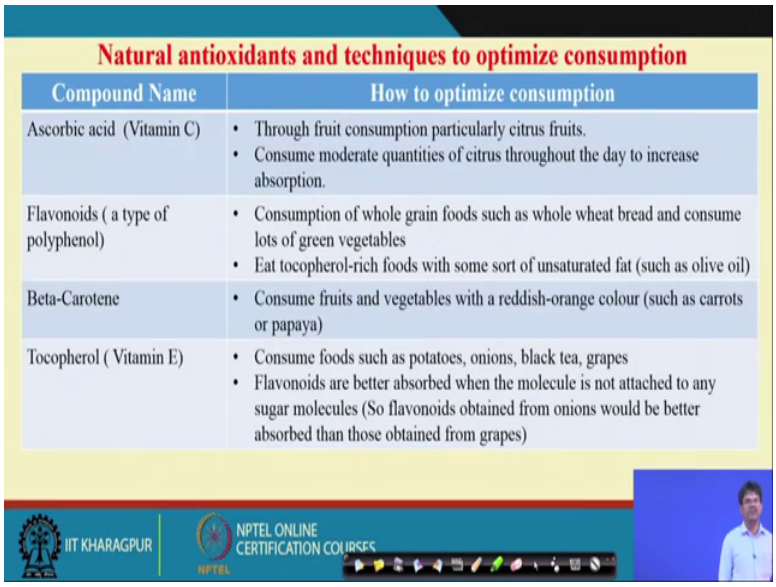

So, this is the natural anti-oxidants and technique to optimize consumption. How we can increase the consumption of the; or the effectiveness of the anti-oxidants that can be very effective in the human body. So, you can see few examples here like ascorbic acids, Vitamin C. How this can be very effective through a fruit consumption particularly citrus fruit and also you have to take consume moderate quantity of citrus fruit throughout the day to increase the absorption of the ascorbic acids or the Vitamin C.

Flavonoids, so that is polyphenols. The consumption of whole grain fruits or the whole wheat bread and consume lots of green vegetables that can increase the flavonoid as

consumed with the intake and the human body or they eat tocopherol rich fruits like your know you know olive oil, oils and the almonds with some sorts of unsaturated fats that is polyphenol unlike you have olive oil. So, this one, the consumption or the use of the flavonoids body can be observed the observantly availability can be better beta carotene.

So, if consume fruits and vegetables with a reddish orange colors such as carrot and papaya that can have supply the better carotenes, then tocopherols Vitamin E consume foods such as potatoes, onions black tea and grapes. Flavonoids are better observed when the molecules is not attached to any sugar molecules. That means, so flavonoids obtained from the onions would be better observed than those obtained from the grapes.

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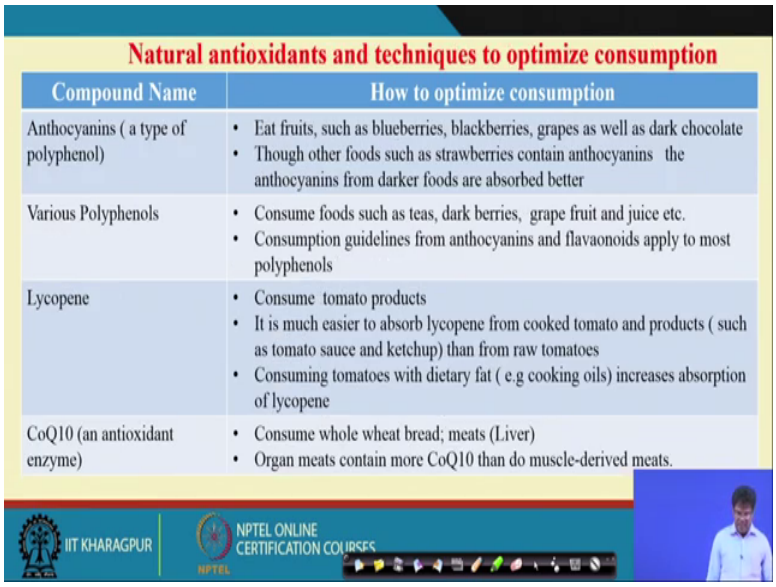

The anthocyanin that polyphenols, so that observance of anthocyanin can be increased. So, eat fruits such as blueberries, blackberries, grapes as well as dark chocolates. So, you can have the higher intake of the anthocyanin through other foods like strawberries contents, the anthocyanin from the darker foods are observed better than the lighter foods light food. That means, the blackberry or the blueberries, they or the dark chocolate also chocolates, so if you are taken take daily intake also, so that can increase the anthocyanin observation in the body. The polyphenols consumed foods as the teas dark berries, grape fruits and juice and consumption guidelines from anthocyanin flavonoids are supplied to most of the polyphenols for lycopene consume tomato products.

So, tomato means you can have it is much easier to observe lykopene from cooked tomato and products, because if you take row tomato, you have less body observation of the lycopene. To have the better observation, higher observations we can take cooked tomato that is stuffed tomato is much better than the cooked tomato. You can say stuffed tomato. So, that has a better observation of the lycopene by human body consuming tomato with the diet repair, the cooking oils that increases absorption of lycopenes instead of raw tomato.

Then Coenzyme Q10, so consume whole wheat breads or the meat especially the liver. That means, the organ meats contains more Coenzyme Q10 as compared to the muscle red meats, organic meats, even the liver meats or the brain meats or the kidney meats. So, those type of organic meats, they contain the higher Coenzyme Q10 as compared to the muscles red meat. So, these are the compounds the anti-oxidants and they have the natural sources from where it is available. So, in the daily food or the diet intake, you can at least include some of the antioxidants, so that we can keep yourself fit from many of the croning diseases.

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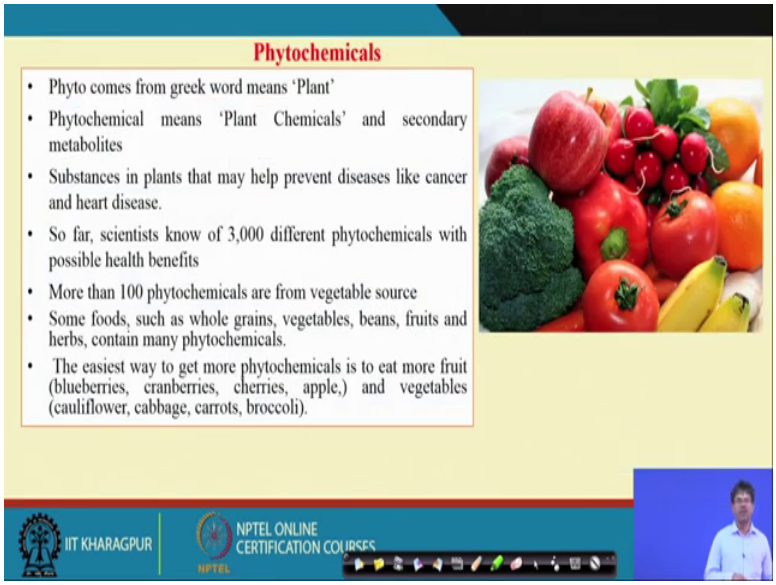

So, similarly the phytochemicals phytochemical means they are plant chemicals. So, they also contain anti-oxidants, the phytochemicals like polyphenols they have these are all anti-oxidants. So, phyto comes from the Greek word that means plant. Phytochemical

means plant chemicals and secondary metabolites, so substances in plant that may help prevent the diseases like cancer and the heart disease.

So, those are phytochemicals. So, as far scientists know about of 3000 different phytochemicals with possible health benefits more than 3000 phytochemicals are from vegetable sources. So, some foods are such as the whole grains, vegetable, beans, fruits and herbs contains many phytochemicals. The easiest way to get more phytochemicals is to eat more fruits. That is blueberries and the cranberries series apple. So, they can provide the phytochemical and vegetables like cauliflower, cabbage, carrot and broccoli.

So, you thought that those vegetables and fruits and vegetables, they provide the phytochemical. That means, in your daily intake we are having the carbohydrates, we are having the proteins, we are having the fats. In addition to that we should take regularly few fruits like the barriers fruits or cherries, apple and also the vegetables like the cauliflowers. Also cooking it depends upon your cooking process how you are cooking, not our cooking, so that the phytochemicals can remain intact, active and they can be better observed by the human body like the cauliflower, the cabbage, the carrots, the broccoli examples the good source of best source of the phytochemicals for the human body.

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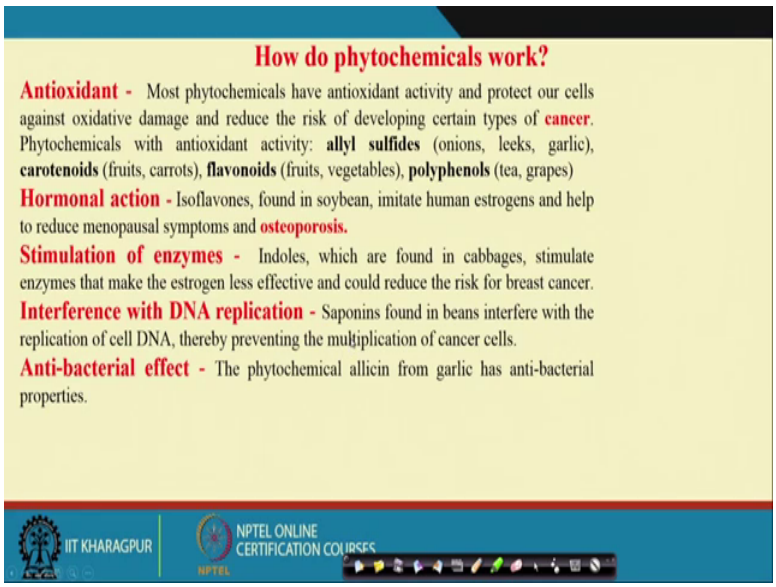

So, see how do phytochemicals work. So, that is the question how you can be effective phytochemicals. So, that phytochemicals they do contain they provide the anti-oxidant

activity because they increases the anti-oxidant activity of the food materials having phytochemicals. The most phytochemicals have anti-oxidants activity that means and protect ourselves against oxidative damage and reduce the risk of developing certain type of cancer.

So, those for example phytochemicals with anti-oxidant activity that is allyl sulfides that comes from onion leeks and garlic and the carotenes comes from fruits like carrots and the flavonoids comes from fruits and vegetables and polyphenols comes from teas and grapes. So, those are the anti-oxidants say poly the phytochemicals comes from the plant origin pattern anti-oxidants. They do help in fighting or in protecting the human being from so many types of cancers, then also there the phytochemicals they have the hormonal actions like the isoflavones. That is flavonoids isoflavones. So, that comes from basically found in the soybean fruits and that inhibited the human extrusions and help to reduce menopausal symptoms and the osteoporosis.

This is especially for the ladies as for the later age. So, they do suffer from the osteoporosis. To avoid that because the loss in the weights, loss in height and also the growth, the bone fractures or the weakness in the bone that comes especially in the ladies. So, by having the isoflavones and that comes from the soya bean, you know the isoflavones that has the higher bioavailability and soya bean is the best source of providing isoflavones.

So, daily intake of soya bean, so that it can protect from this type of disease and mostly soya bean has. Soya bean can be found in many ways. You can have the soya bean seeds, you can have as tofu, soya tofu, we can have the soya milk also and they have a better given the children also can be can be provided daily intake of the soya milk. So, that provides this flavonoid or the phytochemicals and it can protect from any type of diseases in the starting from the child age.

Then, also this phytochemical they have the stimulation of enzymes, they have that means in doles which are found in cabbage simulate enzymes that make the extrusions less effective and could reduce the risk of the breast cancer. So, that is what some enzymes they also simulates enzymes that comes from the phytochemicals. Then interference with the DNA replications that is in saponins found in beans, interfere with the replication of cell DNA thereby preventing the multiplication of the cancer cells.

So, that is what the phytochemicals they work. They prevent the multiplication of the cancer cells. Now, also it has a antibacterial effect. So, the phytochemicals glycine from garlic has antibacterial effect. So, these are the activity of the; or the job or the benefits of having the phytochemicals. They come from the plant sources, so that provide the antioxidants especially for the interpreter cancers and the heart that regulate the hormonal actions stimulations of the enzymes and also interference with the DNA replications that that avoid the multiplication of the cancer cell and has antibacterial effects.

So, having the fruits and vegetables in the daily intake more and more of fruits and vegetables, so you can keep yourself healthy; that means, the health mechanism, health defense mechanism in the body can be enhanced can be, can be increased or improved by having the fruits and vegetables and those anti-oxidants harms the phytochemicals. You can find the organic foods as say has the better contents as compared to conventional.

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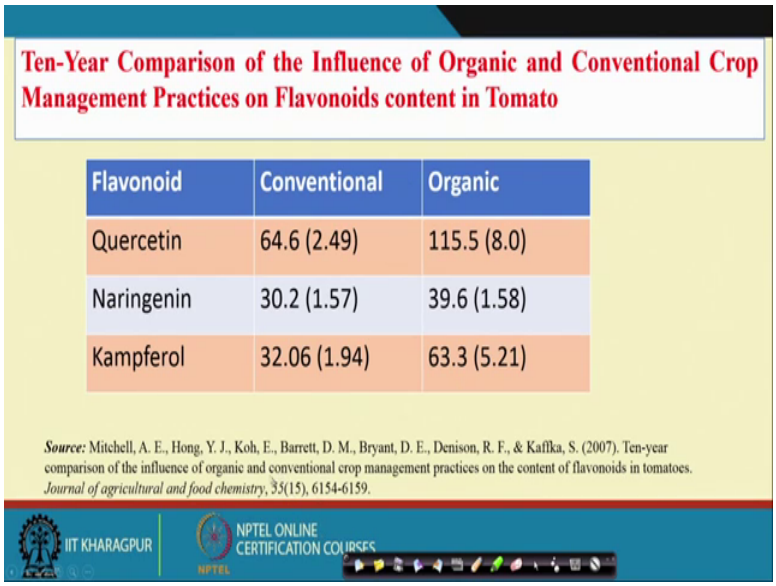

This is how you can say almost if you see talk about the secondary metabolites especially as antioxidants or the phytochemicals, definitely organic foods are healthier or have the superiority as compared to conventional foods.

So, 10 year comparisons of the influence of organic and conventional crop management practice on flavonoids content tomato. So, this research came from the Mitchell at el in

2007. So, from the 10 years study they have found these are the flavonoid compounds or the quercetin naringenin and the kampferol. These are the compounds, these are content in the conventional food. That is chemical fertilizers or the chemical pesticide application and this is the fully organic no application of chemical fertilizers and chemical pesticides. So, if you see the quercentin: so in this case of conventional is 64.6, but in organic it is 115.5 and same for the nerve naringenin.

This is 30.2 in case of conventional. This is very very high in organic and kampferol and these are 32.06 in case of organic. That means, the content of the secondary metabolites is definitely higher in organic products as compared to conventional products. And especially to fight against the disease, to increase the immune systems of the body, to enhance immune system of the body, to have a better health systems we should have the daily intake of the anti-oxidants or that is phytochemicals, and should come from the natural sources say plant based products and because our health systems body systems they have the many enzymes like superoxide dismutase.

So, enzymes are there, they do fight the formation of, against the formation of the free radicals like the super oxides. So, as there is a regular formation of free radicals due to several reason is a revert taking very bad force or you are under stress conditions or, there is a high pollutions in that case, there is a release of the free radical in the body. So, there is a need to neutralize those free radicals and not to allow the formation of free radicals and not to allow the reactive oxygen species coordination in the body to have to reduce those formations which there should be anti-oxidants.

So, anti-oxidants should neutralize the formation of free radicals and they do help in improving the immune systems of the body and they can prevent from many cancer diseases. And those antioxidants can be supplied from the natural sources and the natural sources especially from the organic grown products, because the organic grown products have higher content of phytochemicals or antioxidants and they can fight back many type of diseases like cardiovascular diseases or the cancer diseases or the many crohn's diseases can be can be cured or cannot because they represent or the human beings may not suffer from this type of diseases if you regularly take or in your daily diets, these type of antioxidants from the natural sources, and mostly organic products, they have the higher content of these antioxidants.

With this I conclude this lecture.

Thank you very much.