Corn (Zea Mays) as a nutrient source and diet : A Review

Abstract:-

Maize is also known as corn; it is a cereal. It is a member of Poaceae family which is a grass family. Maize originated 55 to 70 year ago in central America. By seeing phylogenetic tree of grass species of related to maize, we can conclude that there is no direct ancestor of maize. The closest ancestor of maize are teosintes. Maize contains many phytochemical-like phystosterols, carotenoids and many other phenolic compounds. Maize also helps while reliving anti-HIV activity; this takes place due to the prescence of Galanthus Nivalis Agglutinin (GNA) lectin. Maize is the great source of essential fatty assets. The maize cob and the root leaves of it are used to treat problem re;ated to bladder, Nausea, vomiting. The endosperm of maize contains an alcohol solution prolamine called Zein, Which has a great roll in pharmaceutical industry. Maize also contains resistant starch which reduces cancer-cecal, atherosclerosis and obesity related issues .

Keywords: Maize; phylogenetic; prolamine; phytochemicals; resistant starch; potential.

1. Introduction:-

Maize is a cereal grain which belongs to family poaceae. The word zia is a Greek word which mean surviving life. And the word mays is taken from taino language which means giving life to someone.. The synonyms is silk maize, makka, barajobar,etc for maize. In the rntire universe, it is considered as the

most principal food. After consideringwheat as well as rice, it is considered as the third foremost crop of the world. It is referred as the queen of the cereals , since it has a highest production upto 967 million metric ions. USA is the highest producer of maize and contributes 35 percent of the total maize production in the world. Uttar Pradesh, Bihar, West Bengal, Haryana, Jammu and Kashmir , Andhra Pradesh, Himanchal Pradesh, Rajasthan, Karnataka, these together account for about 95 percent of nations world production in India. Cornmeal, grits, starch, flour, tortillas, snacks and breakfast cereals are the forms of the animal fed which is also obtained from maize. Chapatis are also made out of maize in many northern state of India like Punjab and Chandigarh. Maize is majorly studied nowadays because of its nutraceuticals, the phytochemicals compounds and its health properties. Because of its nutritional and health promoting factors, maize is widely used.

2.Taxonomy of maize

Kingdom: Plantae

Subkingdom: Tracheobionta

Superdivision: Spermatophyta

Division: Magnoliophyta

Class: Liliopsida

Subclass: Commelinidae

Order: Cyperales

Family: Poaceae

Subfamily: Panicoideae

Tribe: Andropogoneae

Genus: Zea

`Species: Zea mays

It us an ancestor of corn.The wild relatives of maize is teosintes. Its genus contains 4 species, out of those 4, Zea mays L. is the most economically essential. Its wild species is found in Mexico and CentraAmerica. The chromosomes number of Zea mays is 2n=20. 7 generaare occupied under the tribe Andropogoneae which compromises old and new world groups,these are-, Sclerachne (2n = 20), Trilobachne (2n = 20), and Polytoca (2n = 20), Zea and

Tripsacum, Coix (2n = 10/20), Chionachne (2n = 20), Sclerachne (2n = 20), Trilobachne (2n = 20)

3.Nutritional Utility of Maize-

Themaize contains a kernel which is quite wholesome and edible and has a large amount of nutritive content in it. The kernel contains 71.88grams of carbohydrate, 8.84 grams of protein, 4.57 gram of fat, 2.15 gram of fibre, 2.33 gram of ash, 10.23 grams of moisture, 348 grams of phosphorus, 15.9g of Sulfur, 114mg of Riboflavin, 1.78mg of Amino acids, 1.5g of minerals, 10mg of calcium2.3mg of iron, 286mg of Pottassium, 139mg of magnesium, 0.14mg of copper. Since human diet compromises less of potassium, so maize has high quantity of potassium in it. Coffee beans are also substituted by roasted maize kernels. The oil obtained from maize germ is used in cooking food, salads ,this oil is obtained with the help of milling process. This oil consist of upto 15 percent of saturated fatty acids, 31 percent monounsaturated fatty acids-MUFA and 56 percent polyunsaturated fatty acids. The refined form of thye oil contains linoleic acid 56-60 prcent, oelic acid-PFA 26-32 percent, palmitic acid 11-13 percent, stearic acid 2to 3 prcent and linolenic acid 1 percent. The richest source of tocopherols is the maize oil. The silk maize contains the most essential elements required in our diet which are-, fixed oils, resins, sugar,fibres and salts, maizenic acid,mucilage

4.Phytochemical Importance of Maize-

Phytochemicals value of maize is that these are the chemicals which are biologically active componds, these are present inessence and congentially present in all the plants and thus helps in benifiting humans, Phytochemicals help in degrading the danger of chronic ailment like the diseases related to heart. Maize also contains phenolic acid , carotenoids, phenolic acid, phytosterols, anthocyanins, Sitosterol, Stigmasterol, Campestrol, ferulic acid, xanthophylls, zeaxanthin.

4.1 Carotenoids-

Carotenoids are discribed as a menage of red, orange and yellow pigments. Yellow maize contains the largest amount of carotenoid pigment, especially in floury endosperm. The carotenoids pigments are differentiated into 2 classes-Carotenes and Xanthophylls. Carotenesare considered as the hydrocarbons

which is unbridledofOxgen and Xanthophyll is the pigment which incompass oxygen.

4.2 Phenolic Compounds-

The phenolic compounds are reffered as the phytochemicals present in the plant kingdom which are referred as tannins, flaanoids, stilbenes, coumarins. The part of bran of maize contains all thre phenolic compounds. The most importan and the major phenolic compounds are Ferulic acid (FA) or 4 hydroxy-3-methoxycinnamic acd and anthocyanins. The refined condition of corn bran contains the highest ferulic acid after which wheat and barley contains its maximum amounts.

Anthocyanins are also a group of phenolic compound which is present as flavonoids, these are the water soluble plant pigment and are these are considered as thewidest reaching group of plant pigment. These have red to purple color. The quantity of anthocyanin in maize is second highest, and the most important and efficient anthocyanin component found in maize is cyanidin-3-(3″, 6″ dimalonylglucoside),peonidin-3-glucoside, pelargonidin-3-(6″malonylglucoside), and cyanidin-3-glucoside, cyanidin-3-(3″, 6″-malonylglucoside),and cyanidin-3-glucoside.

4.3 Phytosterols-

These are furtherconsidered as the Plant Sterols which is a very indispensible compouonent of the cell wall and their membrane of plants. There are more than 250 phytosterols and those are differentiated into 3 classes upon the basis of their number of methyl group C-4 position holds simple sterols or 4-Desmethylsterol, 4-Monomethylsterol and 4, 4-Dimethylsterols. The highest amount of phytosterols is present in maize oil. Sitosterol, stigmasterol and campestrol are the most commonly consumed phytosterols. The quantity of phytosterols vary I amount in the kernel of maize such as pericarp, endosperm and germ.

5.Food Processing Techniques for Maize-

1.Dry Milling-

In this process the grinding of whole grain is done to produce flour, this is the simplest method which is used worldwide and is consumed shortly after processing. Crushed germ is also present in the flout. Rancid odour and flavour of flour is due to the oil which is formed from the broken germ cell. For the cornflakes and cereals manufacturing, which are widely consumed in breakfast, large are used. In order to recover regarding the valuable if dry milling germ is pressed. Grits(small as well as large) are consumed in it.

2.Wet milling-

This process is used in developed countries like USA.Ethanol and High fructose corn syrup are obtained using this process of wet milling.

3.Alkali Processing-

In Alkali processing, maize is prepared by cooking it with the help of lemon and water at approximately 89 degree celsisus for 49 minutes and then it is stirres for 15 hours brfore washing it with pure water to remove the residual alkali and the other waste items present in maize.

6.Products of maize-

1.Degerminated flour-

It largely consist of the Endosperm and has a large amount of vitamin B. For the operation of barley malt and thus helps in the production of beer. It is also used to make chapatti preferably called ‘makke di roti’ and bread. The flour is served with a green leafy vegetable mustard leaves.

2.Corn germ oil-

This is procured by solvent extraction. A huge amount of linolenic fatty acid and the fat content is 3.6 percent is found in maize oil . By refining the oil it can be served as a high quality vegetable oil.

3.Popcorn-

This is the most famous food obtained from maize. For making this corneous endosperm is used. It has high popping expansion and a good flavour. Thus starch cookery is done for it. When the kernels of popcorns gets hot, the water vapour expands and thus the pressure increases leading to the popping of kernels. This is used as a supplementary diet for malnutritioned children.

4.Corn Starch-

This is obtained from the operation of wet milling of maize in which the germ and the hull of maize are detach and the corn ground and united with water. Then it is passed through sieves in order to remove the semi liquid material. The protein gets suspended and the starch gets settles which is washed , dried, powdered. It is inexpensive and is superior to potato starch.

5.Cornflakes-

In this, the whole grain is compressed in the huge rollers-metal rollers in order to remove the bran from the outer layer, now this material obtained is mixed with salt, sugar or any other seasoning and water in a large rotating pressure cooker. This cooked grain is taken to conveyor belt, and then passed through drying oven ,this results in soft and solid mass . Then these cooked grains are allowed to cool, and tempering is done. Then these palliate grains are taken to huge metal rollers under large amount of pressure and then are taken to oven where a shock wave of balmy and hot air is given in order to remove remaining moisture and to toast the flavour.

7. **Health Benefits of Maize**

B complex is contained by maize which is very well for skin, heart, brain and and hair. It is also good for appropriate digestion. Maize also removes the manifetation of rheumatism because they ameliorate joint motility. They also improve the functioning of thyroid gland and immune system because they contain vitamin A, vitamin C, and vitamin K along with selenium and beta carotene. Maize contains potassium which has diuretic properties. Maize is also used to treat kidney stones in many countries. It is also considered useful to treat urinary tract infection, kidney stones, fluid retention.and jaundice. Maize

also improves blood pressure levels and it supports liver functioning and produces bile. To improve wounds, swellings and ulcers, it is also used. Maize silk is used for the problems of bladder, nausea and vomiting and also for stomach problems.

Maize oil has fatty acids like linoleic acid which help in maintaining blood pressure and also regulates the blood sugar level. This also helps in regulating cardiovascular maladies. In order to complete the requirement of essential fatty acid, a tablespoon of maize oil is feeded. Maize contains Vitamin E which prevent the dissemination of oxidative stresses in the biological membrane.

Maize contains anti HIV venture because of the appearance of GNA lectin in it. Carbohydrates caan be bound to lectin as carbohydrates receptors are present on the cell membranes. The activity of virus is lectin binds to the sugar. Maize endosperm contain an alcohol soluble prolamine called the Zein, which is biodegradable, non toxic and also has film establishing attributes. Since it has some nutraceutical properties and pharmaceutical , so it also developes nanocomposite antimicrobial agents.

Maize contains resistant starch also known as huge amylose maize, which has a large amount of health benifiting effects. Maize encompass in total of 33.4mg per 100 grams of resistant starch. Maize helps in lowering the cholesterol and thus increasing the fecal excretion. It also minimizes the symptoms of diarrhea and also minimizes the danger of cancer-cecal. Maize also lowers the danger of diabetes antherosclerosis and obesity.

Resistant starch acts as a dietry fibre which helps in weight control . It dilutes energy density of the diet and also modulates certain gene expressions.

8. Conclusion-

Maize contains various important nutrients and phytochemicals due to which it is considered as the major healthy food. It has major health benefits due to which it can be considered as the major diet. Its endosperm consist of 70 percent of starch. Maize oil has also huge health benefits as it is the plays maximum title role in the diet of malnutrition children. Zein has a very high content of leucin. Thus the level of dietry protein is great in case of maize.

9.Reference-

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Fig 1: Morphological View of the plant