

Sweet Corn: New Era Miracle Health Crop

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Abstract: Sweet corn (*Zea mays* L. convar. *saccharata* var. *rugosa*) also known as sugar corn is a hybridized maize variety with high sugar content and is regarded as the queen of cereals. It is treasured for its particular flavor, sweetness, and adaptability in culinary applications, and is widely used in a variety of forms, including fresh, frozen and processed, with industrial canning. Nutritional research reveals it has a high concentration of important vitamins, minerals, antioxidants and dietary fibers, all of which provide substantial health advantages. Phytochemical profiling uncovers a wide range of bioactive chemicals, such as phenolic acids, carotenoids and flavonoids, which contribute to antioxidant activity and possible medicinal uses. Sweet corn's high nutritional content contributes to a number of health advantages, including immune system stimulation, cardiovascular health, anemia prevention and neurological support. Particularly, ferulic acid, B vitamins, pantothenic acid, iron and beta carotene are among the major ingredients responsible for these health-promoting effects. In today's health-conscious societies, sweet corn is positioned as an emerging super food and appears as a valued dietary staple with promising health advantages. This article emphasizes sweet corn's numerous benefits, including its nutritional value, botanical significance and potential medical uses. It also emphasizes how crucial sweet corn is for human health and well-being.

Keywords: Antioxidants, health benefits, nutrition, sweet corn.

Introduction

Sweet corn (*Zea mays* L.) belongs to the family Poaceae or Gramineae, tribe Maydeae, of the genus *Zea*. It was domesticated between 5000 and 8000 BC, having originated in Central America (Aragão, 2002). It stands out among the 250 catalogued breeds of the species *Zea mays* L. which is classified as a vegetable crop. Its primary uses as food include industrial canning (Pereira-Filho and Cruz, 2002) and in natural form (Oliveira Junior et al., 2006). Furthermore, the leftover vegetative portions of plants can be used to make silage for animal feed (Teixeira et al., 2001). According to Okumura et al. (2013), sweet corn is a variety of maize that is harvested and consumed before the physiological maturity stage, when the grains are still soft and before all of the sugar has been converted to starch.

Sweet corn is a cultivated plant grown for human consumption, as a raw or processed material used in the global food industry. It is popular among consumers because of its distinct taste, nice flavor, and sweetness. Sweet corn is frequently eaten in its fresh, frozen, and processed forms (Siddiq & Pascali, 2018). Sweet corn, often known as sugar corn, is a hybridized cultivar of maize (*Zea mays* L.) that has been bred to enhance sugar content and produces green ears 75 to 90 days after seeding. It contains 25% more sugar content more than corn (Singh et al., 2014). The genes that control starch synthesis in the seed endosperm are the main difference between sweet and ordinary corn. The recessive sugary (*su*) gene gives the kernels their sweet flavor by increasing the number of water-soluble polysaccharides (sugars) and reducing starch (Zhang et al 2019). Shrunken (*sh*) genes are found in super sweet or extra sweet foods. These genes enhance the initial amounts of complex sugars, prolonging their flavor by delaying the conversion of simple sugars to starch (Duffy & Calvert, 2010).

The high unit price of the ears of sweet corn makes the product financially lucrative and an excellent substitute for economic exploitation (Pereira-Filho, 2003). Moreover, the vegetative portion can be used to make high-quality hay or silage for animals (Storck et al., 1984). In light of the information gap, the current study, intends to examine the literature on the phytochemistry, nutritional value and health advantages of sweet corn.

Types of sweet corn:

According to Najeeb et al., (2011), sweet corn can be divided into three types.

Standard sweet corn: The sweetness (5–10%) and creamy texture of these kernels are caused by the "sugary (*Su*) gene" in this variety. At this locus, a recessive gene (*Su*) inhibits the conversion of carbohydrates to starch. The homozygous recessive genotype (*Su*) has double the sugar content than normal maize during the green leaf stage.

Sugar enhanced (SE): This maize variety, commonly referred to as "Everlasting Heritage," possesses a gene that raises the sugar content (12–20%) compared to common cultivars (Zhang 2019). This is the most popular type since it retains the texture and softness. Its long shelf life makes it perfect for marketplaces and roadside kiosks. The naturally occurring mutant sugary enhancer₁ (*se1*) modifies the metabolism of starch in the *su1* maize endosperm. Commercially significant in contemporary sweet corn breeding, it is a recessive modifier of *su1*. According to Zhang (2019), *se1* expression is mostly found in the endosperm and is minimal in the tissues of the leaves and roots.

Super sweet (SH₂): The specific corn variety has a gene that yields the most sugar. Super sweet kernels are creamy in texture but have a crisp, stiff outside due to a low concentration of water-soluble polysaccharides. Compared to *Su Su* genotypes, homozygous recessive *Sh₂ Sh₂* genotypes have higher sugar content. Compared to sugar varieties, *shrunken₂* variants have a watery texture as opposed to a creamy one and maintain acceptable quality for a longer period of time throughout harvest (Lertrat&Pulam, 2007).

Phytochemistry, nutritional value and quality:

Sweet corn is rich in vitamins A, B₃, C, folic acid, fiber, minerals and protein as well as carbohydrates and sugars (Gebhardt and Matthews, 1981). According to Brewbaker and Banafunzi (1975), sweet maize has 17% oil, 19% starch, 14.5% protein, and 46% total sugars. When Makhlof et al., (1995) looked into the nutritional value of sweet corn, they found that, on a fresh matter basis, it has 75.7% moisture content, 6.8 mg vitamin C, 2.0 mg calcium, 37 mg magnesium and 15.2 mg of salt per 100 gram. Processed sweet corn has higher antioxidant activity even if it loses vitamin C (Dewantoet al., 2002). Sweet corn has 13% more water, 4.6% more fat, 11.2% more protein, and 72.3% more sugar than other varieties of maize (Fikret & Aydemir, 2018). Together with minerals like magnesium, iron, and zinc, it also includes vitamins A, B, and C. Upon comparison with other whole grains, Siyuan et al., (2018) found that sweet corn had unique nutritional and phytochemical profiles. Ferulic acid, coumaric acid, and syringic acid are phenolic acids found in sweet corn, along with carotenoids and flavonoids (anthocyanins), vitamins A, B, E, and K, minerals (Mg, P, and K), and dietary fiber. A lipid-soluble antioxidant, vitamin E which is composed of tocopherols and tocotrienols supplies nutrients to people and plants found in sweet corn kernels (Xiao et al., 2020). A 100 g serving of sugar maize kernels has 86 calories, mostly from simple carbohydrates like glucose and sucrose. Sweet corn doesn't contain gluten by nature. It offers an excellent profile of phytonutrients that includes minerals, vitamins, and antioxidants along with dietary fiber. Corn has significant levels of antioxidants, flavonoids, phenolic acids and ferulic acid.

In addition to having modest amounts of protein, potassium, and vitamins, sweet corn also contains 5-6% sugar content, 10-12% starch content, 3% polysaccharide content, and 70% water content (Oktem&Oktem, 2005). Additionally, according to Dilip and Aditya (2013), it contains significant concentrations of B-complex vitamins, including riboflavin, thiamin, pantothenic acid, niacin, folates, and pyridoxine. Critical minerals including zinc, magnesium, copper, iron, and manganese are abundant in it (USDA National Nutrient Data Base).

The nutritional value of sweet corn kernels is directly correlated with their water content (72.7%) and total solid content (27.3%). The solid components consist of lipids (3.5%), proteins (13%), hydrocarbons (81%), and miscellaneous substances (2.5%) (Szymanek, 2012). Apart from dietary fiber, vitamins, and antioxidants, corn also contains a small quantity of minerals and an excellent phytonutrient profile. Sweet corn is a rich source of lutein, zeaxanthin, and other carotenoids (Junpatriw et al., 2013). The high content of carotenoids in sweet corn has long made it a part of a healthy diet. It is an appreciated vegetable in developed Western nations worldwide.

In addition to other phytochemicals like melatonin and tryptophan, sweet corn provides a source of antioxidants (Revilla, 2021). As reported by Das & Singh (2016), sweet corn is a good source of phenolics antioxidants. According to Zhang et al., (2017), sweet corn exhibits significant levels of free phenolics and lipophilic tocopherols and the quantity of lutein, zeaxanthin, violaxanthin, alpha-cryptoxanthin, and beta-cryptoxanthin was also shown to follow similar trends. Provitamin A is abundant in sweet maize (Revilla, 2021). Ferulic acid, a remarkable antioxidant present in sweet corn that has a variety of benefits against human illnesses such as diabetes, cancer, neurological and cardiovascular conditions, is one of the most researched phenolic metabolites. Chaudhary et al., (2019).

Health benefits of sweet corn:

Ferulic acid, an antioxidant found in sweet corn, has been used to treat neurological conditions including Alzheimer's, cancer, diabetes, and heart disease (Aslam, 2018). Sweet corn has a high concentration of B vitamin components, including thiamin, which is good for nerve health and niacin, which helps with cardiovascular issues by maintaining optimal cholesterol (Arakelyan, 2019).

Pantothenic acid, a vitamin required for the body's metabolism of lipids, carbohydrates, and protein, is present in sweet corn. In the words of Dilip & Aditya (2013), sweet corn is an excellent source of iron, folic acid, and vitamin B₁₂, which prevents anemia brought on by vitamin deficiencies. Atherosclerosis and elevated cholesterol are treated with corn husk oil. Beta carotene, antioxidants (which slow down aging) and vitamin A (which boosts immunity & improves vision) are all found in abundance in sweet corn. Corn

starch is used to treat allergic skin conditions. Phenolics, among other phytochemicals, are involved in the regulation of hypertension (Swapna et al., 2020). Sweet corn is an important component of the human diet due to its nutritional qualities that promote health. Sweet corn is an emerging superfood for health concerned peoples.

Conclusion & future perspective:

This review addresses sweet corn's genetic, nutritional and health-related attributes, highlighting its value as a crop with a variety of food industry applications and possible health advantages. It has been grown for millennia, and valued for its unique flavor, texture and sweetness. Additionally, the research outlines sweet corn's phytochemical makeup, which includes phenolic compounds, vitamins, minerals and antioxidants that add to the vegetable's nutritional value and possible medical benefits.

Future studies should concentrate on investigating other bioactive substances and their modes of action in addition to carrying out clinical trials to verify the health advantages linked to sweet corn. Additionally, the focus should be on improving cultivation practices to maximize sustainability, nutritional quality, production and minimizing environmental impact. Sweet corn is a superfood that is gaining popularity and has the potential to make a big impact on human health and wellbeing in this age of growing health consciousness and dietary need.

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