AGRIBLOSSOM
www.agriblossom.net
A monthly peer reviewed e-magazine for Agriculture & allied Sciences

Processing and Applications of Flavored Popcorn, Sweet corn Kernels and Cob and Corn Starch

K.S. Gokulraj* and J.Manikandan
Department of Food Technology, JCT College of Engineering and Technology, Coimbatore, Tamilnadu
Corresponding author: gokulraajh200@gmail.com

Introduction

Corn as a food product has been used from the times unseen and as the human race developed and evolved the consumption of different types of corn also evolved. It is said that corn was domesticated for over 10,000 years in the place now known as Mexico and popcorn has been consumed for thousands of years. Though popcorn had been consumed for many years, its emergence in the 19th century had the greatest impact. It is when they were sold in the streets as a snack and during World War II due to an increase in the price of candies and chocolates, Americans consumed popcorn three times they usually did and the popcorn production skyrocketed. Not until the year 1938, popcorn was banned to be eaten in theatres as the owners thought they were a form of distraction from the movies. As we know humans do not have the proper ability to resist the urge for different flavors, he added flavors to the popcorn too and it was another major hit and people loved it. Sweet corn kernels and cob are also a type of maize with high sugar content in it due to phenomena called recessive mutation. It is widely consumed in the United States since the 19th century. Sweet corn was recorded for the first time in the history in the year 1779 when the Iroquois gave it to European settlers and was called “papoon”. The immature sweet corn cob is edible since the cob is very soft and it gets thicker and harder as it matures leaving only the kernels to be edible. Corn starch is the starch obtained from the endosperm of the kernel. It is a non-Newtonian fluid widely used as a food ingredient or additive in the food industries.

Processing of flavored popcorn

Popcorn is a type of maize which has a tendency to expand and pop-under higher temperatures. The requirements of the taste buds have been exploited by the addition of different types of seasonings to

the popcorn. Popcorn seasonings don't only add flavor to the popcorn it also produces some buttery flavor and nature to them. Some of the seasonings may also contain artificial colours and Monosodium Glutamate to enhance the flavor. Flint corn and popcorn are the most common types of maize used in the production of popcorn. Flint corn as the raw material is obtained and cleaned to get rid of the dust and debris and the silk is removed. Then the kernels are removed from the cob and dried to get rid of most of the moisture present in the kernels to prevent them from any kind of microbial spoilage. Each kernel of popcorn contains some amount of moisture and oil. Unlike many other grains, corns usually have a hard and strong hull which is impervious to moisture and the starch inside of it is of the hard type. As the kernels heat up, the moisture inside the kernels steam up and increase the pressure inside the kernels. The steam also helps in gelatinizing the starch inside the kernels thus making it pliable. The hull of the popcorn kernels ruptures at approximately 180^0C with a popping sound thus the name "Popcorn". The hull then ruptures rapidly and explodes, causing a sudden drop in the pressure and temperature inside the kernel and a corresponding rapid expansion of the steam which expands the starch and protein of the endosperm into airy foam. Some flavors are also added to the kernels.

Popcorn can be easily made at home by cooking it in a pressure chamber with some butter or oil and adequate amounts of seasonings for flavor.

*Caramel Popcorn*DIY**

If you are among the people who love caramel popcorn here is a way you can do it yourself at the comfort of your home. All you need is some butter or oil and caramel chocolates, a pressure cooker (you can also use the oven) and of course popcorn kernels. The first step is to melt the butter on a pan and then add an adequate amount of caramel chocolates and melt them too. Once the chocolates melt it is now time to add the kernels to it and cook it the pressure cooker or in an oven at 232^0C for 5 to minutes and you got yourself some caramel popcorn.

Processing of sweet corn kernels and cob

Sweet corn is also a type of maize with high sugar content in it due to a phenomenon called a recessive mutation. They are very rich in antioxidants, carotenoids and zeaxanthin, sweet corn can also promote eye health. It is also said to be a very good source of vitamins and minerals. They also have a very less amount of fats and oil making it an excellent choice as a snack for people like bodybuilders, athletes or any sports person. The sweet corn kernels are separated from the cob by cutting or shelling method. By research, it has been proven that shelling method has a better yield of

sweet corn kernels than that of the cutting method, as there is no cutting involved in the process to separate the kernels from the cob. The small and immature corns are also eaten all around the world including the cob since the cob is soft and tender. The cob only toughens as the crop matures. Sweet corn is also flavored at times with different spices, sugar, butter, etc.

Cutting Method

Traditionally, these corn kernels were separated from the cob with the help of a sharp knife. But, the quality and the yield were poor in this method, thus making it necessary for the development of new and enhanced cutters for better quality and yield. This method also had lots of cob wastes in the kernels. Nowadays, the removal of corn kernels from the cob is done with the help of specialised cutter called rotary drum cutters. In order to obtain kernels of the highest quality, the components that help in the cutting process should be carefully adjusted to ensure that all the kernels are cut off as close to the core of the cob as possible, but without cutting off the cob husks, thus ensuring the best quality of the final product without any cutting residues. Until the recent days it was recommended that the corn kernels should be cut off at two-third of their entire length, leaving the kernels germs on the core of the cob, as the principal in the production of corn were varieties with long cob husks. This cost in the final yield of the kernels. Researches and several studies were done to produce new hybrid forms of corn to eliminate this problem and thus, increasing the yield. Care must be taken that the cut through the kernel be smooth, without tearing the seed cover, and set so that no thick cob husks are among the kernels detached.

Shelling method

In this method of separation of corn kernels from the cob is done by blanching the corn cob and then freezing with liquid nitrogen in the time intervals of 2,4,6,8 and 10 minutes. As time increased the yield also increased. And the most efficient time prior to the separation of corn kernels is 6 minutes any further freezing of cobs doesn't show any effect in the separation process and yield. Once the kernels are removed from the cob it is a whole complex process to store them, starting from material inspection, cleaning, classification, blanching, cooling, dry and save, vacuum sealing by thermoforming vacuum packaging machines, sterilization, then they are ready for sale or further storage. By all the varieties of exported sweet corn products, the package method is mostly canned or plastic bags vacuumed.

Uses of cob

After the separation of kernels, the cobs are also being used for various purposes like preparation of Corn stock and preparation of corn cob jelly and can be consumed after the removal of the debris cobs. Other uses are to smoke meat, can be used as fire starters, animal bedding and as pot scrubbers.

Health benefits of sweet corn

1. Enhances skin texture
2. Removes facial acne
3. Delays aging
4. Enhances blood circulation in the scalp
5. Strengthens hair strands
6. Lowers cholesterol
7. Anaemia
8. Improves vision
9. Boosts energy
10. Prevents diabetes
11. Improves cardiovascular health
12. Helps in digestion

Corn starch

Corn starch also is known as cornmeal or maize starch, having high carbohydrate content in it since it is completely starch and the fat content is also very low. They are a common ingredient used as a food thickener in sauces, ketchup or soups and to make corn syrup and other sugars. Earlier in days before it has been used in the preparation of food, corn starch was used in the textile industry to provide thickness and weight to the clothes.

Preparation of corn starch

As we approach the process of separating the starch from the corn, we do not want to forget that it is a very complex process and involves many different procedures to obtain the starch in very fine quality. It is essentially derived from the endosperm of the corn kernel. The first stage to obtain corn starch involves corn cleaning and steeping to weaken the gluten bonds and release the starch. They are then milled so that the germ is separated from the fibre, gluten and starch. The corn germ which is thus removed has corn oil and is made to remove from the slurry, washed and then removed from

the water. The fine milling process takes place by a special kind of a mill that grinds the harder parts of the corn. The starch is thus removed completely and fibre is kept coarse and is removed by the fibre washing process. Then, came the starch and gluten separation process from the starch milk, where the starch leaves the separator as the underflow and the gluten leaves as the overflow. The starch slurry obtained is then dewatered through rotary drum filters or peeler centrifuge and the dewatered starch cake is made to go through drying equipment and dried and this corn starch is obtained.

Applications

1. Used a thickening agent in food industries
2. Helps soothe and calm skin irritations
3. Deodorant
4. Removing oil stains
5. Homemade face and finger paint
6. Used in textile industries to thicken and increase the stiffness of the clothes

Conclusion

Corn is one of the major crops in the farming and food industry as it plays a very vital role directly or indirectly in the production of many food products. Though having an important role in the food industry, it still lacks in major nutritional values than many other kinds of cereals. Thus, making it neither a boon nor a ban in the food industry. In this article, we explained the industrial processes and uses and applications of flavored popcorn, sweet corn and cob and corn starch.