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# STEVIA: A POTENT PLANT TO BE USED AS SUBSTITUTE OF SUGAR IN LOCAL FRUIT PRODUCTS IN UZBEKISTAN

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**Abstract:** Almost in all the food preparations where sweetness is required sugar (carbohydrate), is added which gradually becomes a threat to become diabetic if excessively consumed. Nowadays prime focus is to design and develop food articles using alternative natural sugar substitute (sweetener). The present article briefly mentions the plant substitutes which are commonly used to sweeten the food specially desserts. The commonly used plant species for natural sweetness and flavour are Stevia, cinnamon, ginger and turmeric. The various types of desserts can be prepared using all these plant species which not only provide a good taste but also add health benefits as all these plants are rich source of phytochemicals and are also medicinally acclaimed in traditional medicinal systems of world.

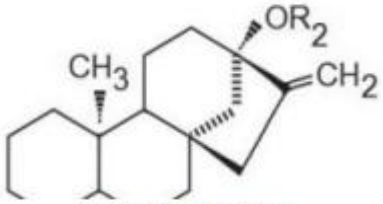
**Key words**: artifical sweetener, diabetes, phytochemical compounds.

## Introduction

Diabetes is one of the most progressive diseases in the world which results due to irregular metabolism of sugar in the body. The prevention of the disease at the primary level is to reduce sugar (sucrose) intake in the prepared food items. In 2022, 14% of adults aged 18 years and older had diabetes, an increase of 7% since 1990. In the same year, more than half (59%) of adults aged 30 years and older living with diabetes were not taking medication to control their disease. Diabetes treatment coverage was lowest in low- and middle-income countries.

In 2021, diabetes was the direct cause of 1.6 million deaths, with 47% of all diabetes-related deaths occurring among those under 70 years of age. Another 530 000 deaths were attributed to diabetes-related kidney disease, and elevated blood glucose levels are responsible for about 11% of deaths from cardiovascular disease [1].

To combat this situation globally several natural sugar (sucrose) substitutes are used in the food industry and at home to avoid excessive consumption of sucrose [2]. *Stevia rebaudiana* Bertoni is currently one of the most studied and researched natural sweeteners. Its chemical composition and uses have been extensively studied over the past 40 years. It was originally cultivated and exported by countries such as Japan and China however now many countries use this plant as natural sweetener including USA and Canada. The plant leaves are rich source of diterpene glycosides which are 50-300 times sweeter than sugar and safe for humans when used




*1-расм. Дитерпенли стевиолгликозидларининг тузилиш формуласи, R1 ва R2 – моносахаридлар қолдиги*

Figure 1

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as a natural sweetener even for long periods of time. It is widely used in food industry for preparation of drinks, yogurts, ready-made soups, sauces, bread and bakery products, etc.

**Aims and Objectives**

In order to make a small contribution to the processing of fruits and vegetables in Uzbekistan, their realization on domestic and foreign markets, we came to the opinion that the preparation of desserts based on such useful food additives would be of great importance. Thus, an attempt was made to prepare safe and vitamin-rich sweets for diabetic patients as well as children with a sweet tooth by adding various healthy additives like ginger, cinnamon, turmeric and stevia to local fruit curd.

The chemical composition of Stevia was extensively searched through various search engines like Google scholar, Pub Med, etc. Further the effect of stevia leaves on the chemical composition, flavor and other physicochemical parameters of the stevia added fruit curd was studies.

**Chemical composition of Stevia and their functions**

The main structural component of Stevia is diterpene glycosides i.e., aglycone steviol (Figure 1). It is one of the 8 most common types of diterpene steviol glycosides (SGs) found in nature. In addition to SG, other organic substances of nutritional and therapeutic value were also found. The dry leaf extract contains 10% amino acids, 18% proteins, 33% carbohydrates and 39% sugars [3]. 10.5-18.5% of polysaccharides is cellulose. This composition provides a feeling of satiety for a long time, limits the consumption of caloric foods and promotes healthy weight loss. Stevia roots and leaves also contain plant fructooligosaccharides (4.6% and 0.46%, respectively), which belong to the group of prebiotics. They play an important role in lipid metabolism and diabetes control [4].

Unlike aspartame, stevia sweetener is thermostable and resistant to acidic environment, it does not undergo fermentation, which makes it suitable for use in a wide range of food products. According to L. Serio, stevia leaves and glycosides are thermostable at temperatures up to 200°C, so they do not change their composition and structure even with heat treatment [5]. Two types of sweets from different fruits and their mixtures were prepared. The first one is in the form of cubes thicker (2 cm) and softer (Figure 2).

The second has the shape of a smoothly spreading leaf (Figure 3).

**Method of preparation of dried fruit**

In general, for the manufacture of dried fruit (the second type), it is necessary that the raw material from which it is made, has a high content of natural gelling agents or pectins in its composition. We tried to make dried fruit from different berries and came to the conclusion that this delicacy is also good from cranberries, rowanberries, currants and raspberries. However,

*Figure 2*

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compared to apple, berry was not so dense, and there was more trouble in its preparation. Because of this, berry were used mainly as an addition or layer between layers of apple, as in the above-mentioned varieties.

Technology of preparation of dried fruits (from apple)

**1.** First of all, wash the apples, cut them into large pieces. Let's take 1 kilogram of fruit as a basis. The smaller they are, the faster the apples will decompose into a puree. Usually it is enough to cut small apples into quarters, cut the sides of large apples with wide movements, throwing out the core.

*Figure 3*

**2.** Put the raw materials in a saucepan, add 50 ml of water. Put on low heat, stew for 10-15 minutes under a lid, occasionally stirring with a wooden spoon. When the apples become more like a puree, turn down the heat, remove the lid and stir for another 8-10 minutes. Next step: while the puree is still hot, rub it through a sieve. The output will be about 700 grams of puree. Anything that is not pureed should be discarded. Add stevia to the still warm puree: about 53 g. Also add 10 g of ground ginger, 8 g of turmeric powder and 5 g of cinnamon powder. Stir.

**3.** Cover a baking sheet or shallow mold with polyethilene stretch wrap so that it goes over the sides.

**4.** Pour the resulting puree onto the baking sheet, flatten (the layer should be about 1 cm).

**5.** Set the dryer to a temperature setting of 55-60°C. Higher temperatures may cause burning or uneven drying. Dry until the puree is dry and pliable, but not brittle. The time can vary from 6 to 12 hours depending on the type of fruit and the thickness of the layer.

**6.** The finished product is almost dry on top, with a few drops of syrup visible on it. It decreases in volume due to the fact that the moisture has evaporated. Carefully separate the dessert from the base, cut into strips and twist into rolls. And now you can store in parchment or a plastic bag.

This treat is useful due to the absence of harmful substances in it (flavor enhancers and color fixers, in particular), preservation of vitamins and trace elements, and pectin contained in apples favors digestion. All this speaks in favor of the product as a special, unusual and useful dessert. If the base does not separate well, trim the edges. If a piece of parchment stuck in the middle, run wet fingers over it, and the paper can be removed. Store homemade pastilla either in a glass jar with a closed lid, or wrapped in parchment paper in a kitchen cabinet. By the way, it is stored for about a year, so you can prepare marshmallow according to our recipes in advance. Ready pastilla can be cut out in the form of any shapes using molds, making the treat even more original.

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**The dried fruit in this way has such useful properties:**

- Micronutrients, which it is rich in, contribute to the normalization of metabolic processes.
- Fiber adjusts digestive processes, is able to cleanse the body of toxins, remove excess cholesterol.
- Tormalizes the work of the gastrointestinal tract, improves emotional well-being.
- Different additives like turmeric, ginger and cinnamon prevent the development of diabetes mellitus

So, for example, dried apple is rich in vitamins PP and B2, proteins and carbohydrates.
Its consumption is able to tone the body, giving a sense of vigor and filling with new strength. Vitamin C in strawberry pastille more than in citrus fruits.
It is recommended to consume it for people who suffer from cardiovascular diseases and high edema, as strawberries contribute to the removal of excess moisture from the body.
Regular consumption of products rich in iron contributes to the normalization of hematopoiesis, increasing hemoglobin levels. Therefore, it is difficult to overestimate the useful properties of product. Since there are no fats in, the sweet can sometimes be consumed when dieting. Such a treat perfectly satisfies the human need for sweet.

**Results**

In the product – apple the amount of stevia was up to 75 mg/ 100 g of product, depending on the amount of sugar. The flavor of the product was not affected. Higher dosage resulted in a slightly bitter aftertaste. Soft candy.

In addition, the product prepared on the basis of Stevia was practically not different in taste and texture from the same dessert prepared from 100% sugar. Also, such products are low in calories [6]. Some fruits are rich in carbohydrates and therefore sweet. They do not require the addition of stevia or a very small amount. Also sour fruits require more stevia. Below is the amount of sugars in the fruit and the amount of stevia added (Table 1):

| **Fruits** | **sugar concentration in the fruit (g/100g)** | **weight of stevia added per hundred grams of product** |
|---|---|---|
| Apple | 9.3 g | 0.5 g |
| Plum | 8.2 g | 0.4 g |
| Cherry | 12.8 g | 0.75 g |
| Apricot | 10 g | 0.5 g |

Also, adding additives such as cinnamon, ginger and turmeric to such candies further increases the healing and medicinal properties of the candy. In some studies it was found that cinnamon may help increase insulin levels, the hormone responsible for regulating blood glucose levels, which is beneficial for people with prediabetes and type 2 diabetes. Taking *ginger* root powder reduces the concentration of apoproteins A and B, malonic dialdehyde, and thus reduces the risk of complications of type 2 diabetes mellitus. The antioxidant properties of ginger root are superior to drugs such as glibenclamide in the treatment of diabetic patients [7]. Turmeric is also used for medicinal purposes in many countries and it can also be used in the treatment of diabetes mellitus. Its main component

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curcumin has anti-diabetic activity. When prescribed to prediabetic patients, the risk of developing type 2 diabetes can be significantly reduced. In addition, curcumin can be used for the prevention and treatment of diabetes and as a potential replacement for some complications such as diabetic retinopathy [8].

**Conclusion**

These value added products developed without any harmful artificial sweetener will serve not only patients with metabolic disorders or diabetes, but also a wide range of consumers.

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