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STUDYING OF POMEGRANATE IN UZBEKISTAN. A REVIEW

Buriev Kh. A.

Termiz State University of Engineering end Agrotechnologies, senior teacher of the Department of Light Industry and Food Technologies, Termiz

Abstract. This article provides detailed information about the types of pomegranates grown in the southern region of Uzbekistan and their geographical importance. According to the results of the research, today most of the pomegranates grown in Surkhandarya belong to Sherabad district. Pomegranate here has found that it meets all the standards of the climate in order to grow more comprehensively than in other regions. In addition, it was found that the content of biologically active comonenets is higher than that of anorla grown in other regions. Detailed information about pectin is also given.

Keywords: Pomegranate, Surkhandarya, Sherabad, pectin, biological substances.

ИЗУЧЕНИЕ ГРАНАТА В УЗБЕКИСТАНЕ. ОБЗОР

Буриев Х. А.

Термезский государственный университет инженерии и агротехнологий, старший преподаватель, кафедра легкой промышленности и пищевых технологий, г. Термез.

Аннотация. В данной статье представлена подробная информация о видах гранатов, выращиваемых в южном регионе Узбекистана, и их географическом значении. По результатам исследований, сегодня большая часть гранатов, выращиваемых в Сурхандарьинской области, относится к Шерабадскому району. Гранат здесь обнаружил, что он соответствует всем стандартам климата, чтобы расти более комплексно, чем в других регионах. Кроме того, установлено, что содержание биологически активных комонетов выше, чем у анорлы, выращиваемой в других регионах. Также дана подробная информация о пектине.

Ключевые слова: Гранат, Сурхандарьинская область, Шерабад, пектин, биологические вещества.

O‘ZBEKISTONDA ANORNI O‘RGANISH. SHARH

Bo‘riev X. A.

Termiz davlat muhandislik va agrotexnologiyalar universiteti katta o‘qituvchisi, Yengil sanoat va oziq-ovqat texnologiyalari kafedrasi, Termiz.

Annotatsiya. Ushbu maqolada O‘zbekistonning janubiy mintaqasida yetishtiriladigan anor turlari va ularning geografik ahamiyati haqida batafsil ma’lumot berilgan. Tadqiqot natijalariga ko‘ra, bugungi kunda Surxondaryoda yetishtirilayotgan anorlarning asosiy qismi Sherobod tumaniga to‘g‘ri keladi. Bu yerdagi anor boshqa hududlarga qaraganda kengroq o‘sishi uchun iqlimning barcha me’yorlariga javob berishini aniqladi. Bundan tashqari, biologik faol komonetlarning tarkibi boshqa hududlarda yetishtiriladigan anorlanikidan yuqori ekanligi aniqlandi. Pektin haqida batafsil ma’lumot ham berilgan.

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Kalit so‘zlar: Anor, Surxondaryo, Sherobod, pektin, biologik moddalar.

Introduction. Human beings have cultivated pomegranate (*Punica granatum* L.) for its medicinal and nutritious properties for over 4000 years. The pomegranate has significant importance in the ancient cultures of the Mediterranean countries. Pomegranate fruit with 2.5–three million tons of annual global production is used to manufacture a wide range of food products such as fruit juice, concentrate, anardana, jam, candies, toppings, and canned arils besides its fresh consumption. Industrial processing reveals a large amount of by-products or wastes, including peel, pulp membrane, seed, and aril pomace[1,2]. Among industrial residues, the peel is the most abundant part by weight, constituting 30–50% of the total fruit weight[3,4]. Studies showed that the phenolic compounds (flavonoids and hydrolyzable tannins) present in pomegranate peels have antioxidant, antiproliferative, antidiabetic, antiallergic, anti-influenza, antimalarial effects as well as antimicrobial activity, which may, in turn, extend the shelf life of foods as well as provide health-promoting effects[5,6]. The pomegranate juice waste, seed, is another considerable part (3.7–7.9% total weight), which yields up to 20% oil[7]. The antioxidant potential of pomegranate rind powder extract (PRP), pomegranate juice (PJ), and pomegranate seed powder extract (PSP) was evaluated in raw ground pork meat stored at 4±1°C for 12 days. The pH values decreased from 5.88 to 5.61. The standard plate count in the PRP group was significantly (p<0.05) lower than that in all other groups[8].

In studies on pectin yield from different pectin sources, it is 18-20% in apple pomace [9], 15.70% in lemon, orange and grapefruit peel [10], 10.83-13.13% in lemon pulp [11].

Durian fruit 8.7-9.3%, banana peel 11.87-16.54%, sour orange peel 6.2-26.2%, 5.2-Banana peel, potato pulp 4 .08-14.34% was determined as [12,13]. Considering the pectin yield of the pomegranate peel used in the study, it seems to be a very good source for pectin production.

4 varieties of pomegranate are included in the state register of agriculture recommended for planting in the territory of Uzbekistan. Due to favorable conditions, the following varieties of pomegranate are grown in our republic: "Ulfi", "Pushti Gulosha", "Aq dona (appetizing)", "Achchik dona", "Desertniy", "Kazakh pomegranate", "Dashnobad" variety and others. Today, 82,900 tons of pomegranates are grown in our country every year, and 19,400 tons of them are exported[14].



Figure 1. At the Pomegranate Festival held in Surkhandarya

Extraction of pectin from pomegranate peel and its properties.

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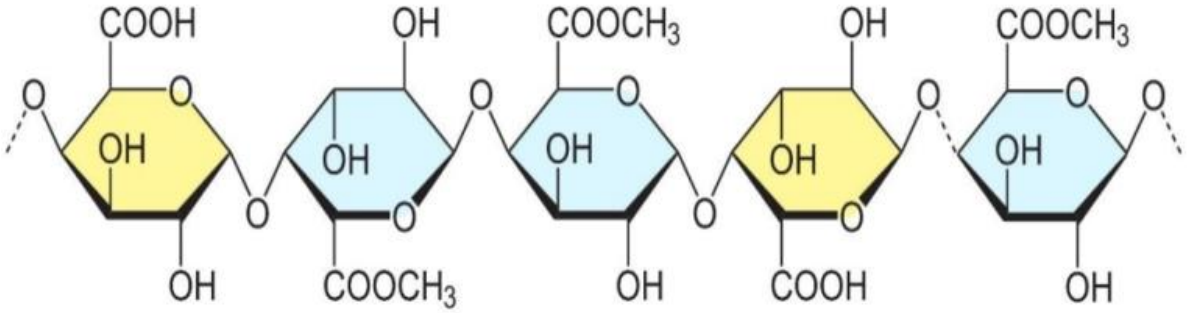
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For example, Sherabad, Muzrabod districts in Surkhandarya region, Kitab district in Kashkadarya, Chust district in Namanganda, Mirzaabad, Sardoba districts in Syrdarya, and some areas of Kuva and Tashloq districts in Fergana were specialized in pomegranate cultivation. Currently, more than 30 varieties of pomegranate are being cultivated in Kuva district. The part of the grown crop that exceeds the domestic demand is exported to Korea, Russia and other countries. "Kuva Pomegranate Agrofirm" pomegranate cluster was established, with a total of 409 hectares and 56 pomegranate farms attached to it. Today, gardeners in the Kuva district of Fergana region are engaged in the localization and propagation of the ancient seedless (seedless) variety of pomegranate. All plant tissues, including pomegranate, contain the naturally occurring carbohydrate pectin. Pectins are a class of structural heteropolysaccharides found in the middle lamellae and primary cell walls of higher plants. They are mainly composed of units such as covalently linked D-galacturonic acid. For a long time, the food and beverage sectors have used these polysaccharides. Pectin is mainly used as a thickening, stabilizing, emulsifying and gelling agent. In the food industry, this traditional use of pectin is widely used as a fat substitute and functional component to promote health [14].

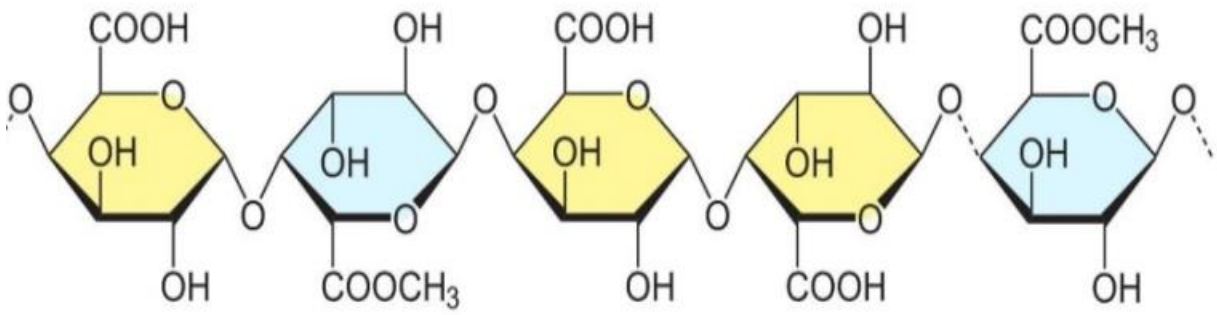
Classification of pectins. When classifying pectins, they are calcified according to their methoxylation level. Methoxylation was calculated as the percentage of esterified galacturonic acid units relative to the total galacturonic acid units in the pectin molecule. This is determined by the effect on the solubility of pectin and the ability to form a gel.

High methoxyl pectin - in which pectin has more than 50% methoxyl groups.



Structural formula of high methoxyl pectin

Low methoxyl pectin - in which pectin has less than 50% methoxyl groups.



Structural formula of lower methoxyl pectin

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Physico-chemical properties of pectin. If pectin is sufficiently dissolved in water and stored in a cool, dry environment, it has gel-forming, thickening, and stabilizing properties. The general properties of pectin are: Pectin dissolves in hot water (85-90 ° C), pectin should be stored in a cool and dry place. This is because the decrease in pectin molecular weight leads to decomposition at high temperatures. The optimal pH range of pectin is 2.8-4.7. Pectin solutions have a lower viscosity than other thickeners. The viscosity of low molecular weight pectin solutions increases with bivalent salts (eg, Ca^{++} and Mg^{++}). Acidity increases in calcium-free solutions, which leads to a decrease in viscosity [15,16].

Pulsed ultrasound-assisted extraction, using just water as solvent, and spray-drying microdispersion, using low methoxyl pectin as polymeric matrix, have been employed, respectively, to extract and formulate the water-soluble bioactive molecules from these by-products. From 100 g of pomegranate fresh marcs, almost the same quantity of phenolic compounds found in 100 mL of the corresponding juice can be extracted with similar antioxidant activity, but with higher content in vitamin C and practically without total soluble solids. The extracts have been sprayed obtaining powders with an encapsulation efficiency of about 50%. Finally, fresh-cut apple wedges were enriched by vacuum impregnation with the formulated extracts, tentatively used as potential novel ingredients, obtaining “polyphenol-enriched” apples [17]. This study was aimed to evaluate the antibacterial and antioxidant characteristics of incorporated pomegranate juice (PJ) and pomegranate rind powder extract (PRPE) into meat burgers. The peroxide value, thiobarbituric acid reactive substances, and metmyoglobin content for different burgers during 90 days storage at − 18 °C were evaluated. Total anthocyanin content, total phenolic content (TPC) and free radical scavenging activity (RSA or IC50) for PJ and PRPE were measured as 18.90 (mg/mL), 4380 ppm, 0.136 (mg/mL) and 0.40 (mg/mL), 5598 ppm, 0.084(mg/mL), respectively [18]. This review intends to provide a general and organized overview of the accumulated knowledge on pomegranates, the identification of the most bioactive varieties, their potential consumption pathways and seeks to provide knowledge on the present gaps to guide future research[19]. Punicalagins are the main ingredients of phenolic compounds in pomegranate (Punica granatum L.) husk. A simple and accurate method for punicalagin analysis based on ethanol extraction and RP-LC using linear gradient of methanol in 0.1% TFA solution was established. The mean value of punicalagins content in pomegranate husk was 82.4 mg g−1[20].

Conclusion. This article examines the pomegranates grown in Surkhandarya and provides information about pectin in order to extract pectin from them.

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