Journal of Chemistry of Goods and Traditional Medicine

J Chem Good Trad Med, Volume 3, Issue 3, 2024 Traditional Medicine

CONTENT OF VITAMINS IN BITTER WATERMELON GROWN IN DIFFERENT ENVIRONMENTAL CONDITIONS

Qahramon L. Lutfulin
Andijon davlat universiteti, Kimyo kafedrasi professori, kimyo fanlari doktori

Zubaydakhon O. Mirzaeva
Andijan State Pedagogical Institute, Senior teacher of the Department of Chemistry Teaching Methodology
https://orcid.org/0000-0001-8674-3718
E-mail: mirzayevazubayda5@gmail.com

DOI: https://doi.org/10.55475/jcgtm/vol3.iss3.2024.312

Keywords:
Bitter watermelon, juice, seeds, protein, vitamins

Abstract
In this article, the amount of vitamins in the juice and seeds of the bitter watermelon planted in the salty and hilly soil environment of Andijan region was determined and compared and presented in the form of tables and diagrams. The amount of vitamins was studied by the method of high-performance liquid chromatography.

How to Cite
Lutfulin, KL, & Mirzaeva, ZO TURLI MUHIT SHARTLARIDA YETILGAN ACHCHIQ TARVUZDAGI VITAMINLARNING MAZMUNI. Tovarlar va an'anaviy tibbiyot kimyosi jurnali , 3 (3). https://doi.org/10.55475/jcgtm/vol3.iss3.2024.312

The bitter watermelon plant (Citrullus colocynthis) belongs to the Cucurbitaceae family, the Citrullus family, and is widespread in the Mediterranean and Asia. It is usually considered the ancestor of cultivated watermelon (Citrullus lanatus) [1].

Bitter watermelon is a herbaceous plant that contains a large amount of nutrients. Citrullus Colosynthis has many biological properties such as antioxidant, hypoglycemic, antibacterial, anti-cancer, anti-inflammatory, analgesic, gastrointestinal, anti-microbial, anti-diabetic, antineoplastic, profibrinolytic, anti-allergic. Citrullus colocynthis contains cucurbitacin, flavonoids and there are many bioactive compounds such as polyphenols [2].

Bitter watermelon fruit contains carbohydrate, protein, amino acid, tannin, saponin, phenol, flavanoid, flavone glucoside, terpenoid, alkaloid, anthranol, steroid, cucurbitacin, saponarin, glycoloids. It has antioxidant, anti-diabetic, anti-microbial, anti-cancer, anti-inflammatory, analgesic, reproductive, protective and other pharmacological effects [3].

The dried fruit peel of bitter watermelon is used to treat gastrointestinal disorders such as indigestion, gastroenteritis, and intestinal parasites. Citrullus colosynthis also has excellent pharmacological properties, such as laxative and purgative; it is a medicinal plant against diabetes, inflammation, anthelminth and cancer [4]. Bitter watermelon seed powder has been used as an emulsifier, fat binder, and fragrance [5].

Bitter watermelon fruit is widely used among herbalists in Iran to treat diabetes. Diabetes is one of the fastest growing metabolic diseases. Therapy is symptomatic and requires lifelong use of pharmacological drugs. [5].

The nutritional composition of bitter watermelon seeds was studied by Milovanovic and Pikurik-Jovanovik (2005), who reported that the dry weight of the seeds was 52.3%, the moisture content was 54.5%, and the oil content was 22.1-53.5%. found that the protein content is 21.8% and

most of the fatty acids in the plant are unsaturated acids (77.4%), including linoleic acids (62.2%) [6].

When the chemical composition of bitter watermelon seed extract was determined, it was found that there are many compounds such as tetradecane, hexadecane, pentadecane, cinnamic acid derivatives, linalool and butylated hydroxyanisole. The pharmacological activities of the plant are related to the compounds identified in the bitter watermelon seed extract, as chemical analysis of the extract has shown that there are many potential biologically active compounds with pharmacological activity, including antioxidant and antibacterial activity [7; 8;], including 2,4-nonadienal has been found to have antifungal, antidiarrheal and antioxidant effects [9]. Tetradecane, hexadecane, as well as pentadecane are alkanes with antifungal and antibacterial effects [10]. Linalool, which has antioxidant and antimicrobial properties, is one of the main compounds in bitter watermelon seed extract [11; 12;]. Butylated hydroxyanisole has also been found to have an antioxidant effect [12].

Currently, the search for more effective alternatives to diabetes treatments continues. An aqueous extract taken orally may alleviate some of the adverse effects of streptozocin and also lower blood glucose levels [5].

During today's research, the amount of water-soluble vitamins in bitter watermelon juice and seeds grown in different environmental conditions was determined by the method of high-performance liquid chromatography.

Experimental part. Determining the amount of vitamins in bitter watermelon juice and seeds. The amount of water-soluble vitamins was studied by the method of high-performance liquid chromatography. Water-soluble vitamins in the sample were determined using high-performance liquid chromatography.

Work performance: 5-10 g is taken from the drawer on an analytical balance and placed in a 300 ml flat flask. 50 ml of 40% ethanol solution is added to it. The mixture was heated under vigorous stirring for 1 h, equipped with a magnetic stirrer, reflux condenser, and then stirred at room temperature for 2 h. The mixture is cooled and filtered. 25 ml of 40 percent ethanol was added to the remaining part and re-extracted 2 times. The filtrates were combined and filled to the mark with 40% ethanol (5-10%) in a 100 ml volumetric flask. The resulting solution is centrifuged at 7000 rpm for 10 minutes. The resulting solution was taken from the upper part for analysis.

Working solutions of water-soluble vitamins with a concentration of 1 mg/ml were prepared. For this purpose, 50.0 mg of each vitamin standard is drawn on an analytical balance and dissolved in a 50 ml volumetric flask in 40% ethanol and filled to the line. Phosphorus, acetate buffer systems, and acetonitrile were used as eluents in the literature for the determination of water-soluble vitamins by USSX. We used an acetate buffer system and acetonitrile.

Chromatographic conditions:
-Chromatograph Agilent-1200 (equipped with an autodoser)
-Column Exlipse XDB C 18 (obraschenno-faznyy), 5 μm, 4.6 x150mm
-Diode array detector (DAD), 204 nm, 254 nm, 290 nm identified.
-Flow rate 1ml/min
- Eluent acetate buffer: acetonitrile:
0-5 min 96:4,
6-8 min 90:10,
9-15 min 80:20,
15-17 min 96:4,
thermostat temperature 2500C, -5 μl input amount (vkol)

First, working standard solutions and then prepared working solutions were introduced into the chromatograph.

Table 1. **Amount of vitamins**

Vitamin	Bitter watermelon juice grown in hill	Bitter watermelon seeds grown in hill	Bitter watermelon juice grown in saline soil	Bitter watermelon seeds grown in saline soil
	Concentration mg/g			
B_1	0,000	0,0382	0,00	0,021
B_2	2,151	1,4440	0,06	0,000
B_6	2,637	3,8146	0,15	0,293
B_9	148,120	0,0000	117,05	0,000
PP	0,047	0,1668	0,49	0,000
C	12,527	0,0784	7,97	0,023

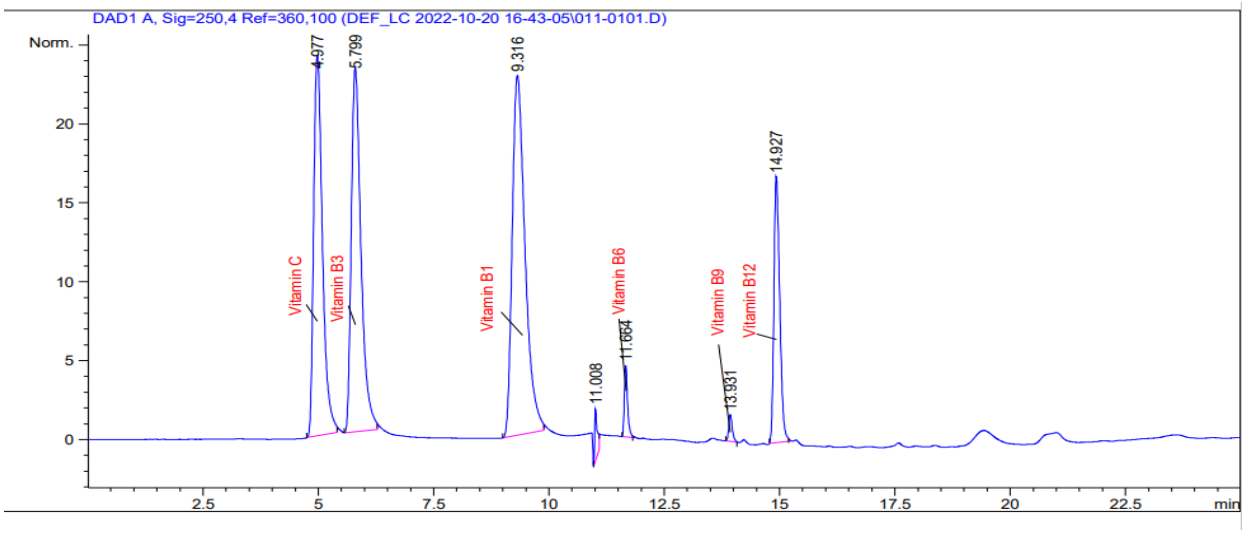


Figure 1. Standard chromatogram of vitamins.

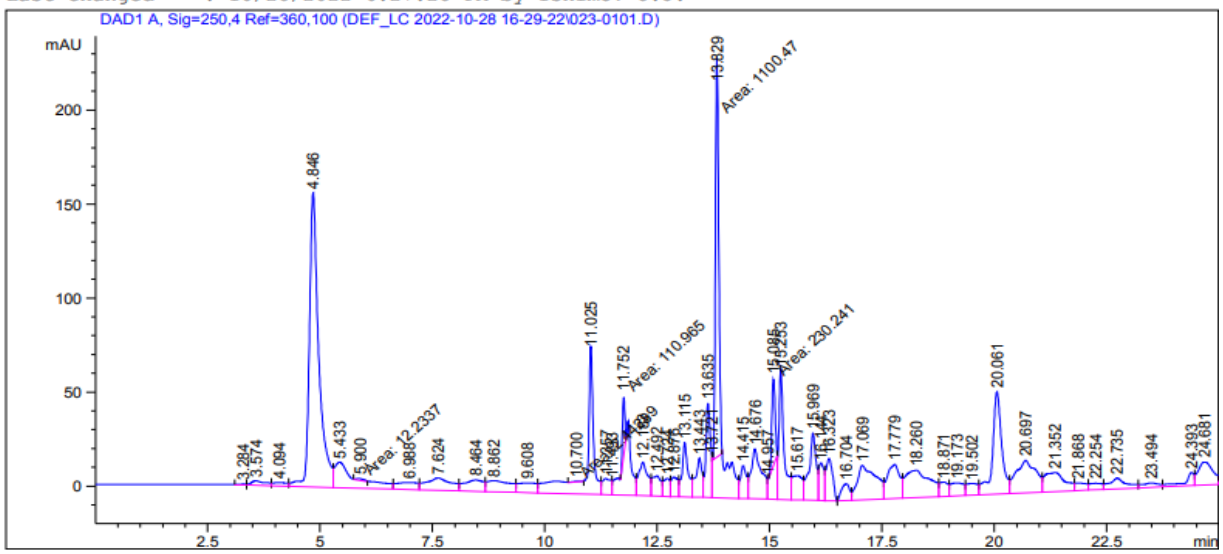


Figure 2. Chromatogram of vitamins in bitter watermelon juice grown in hill.

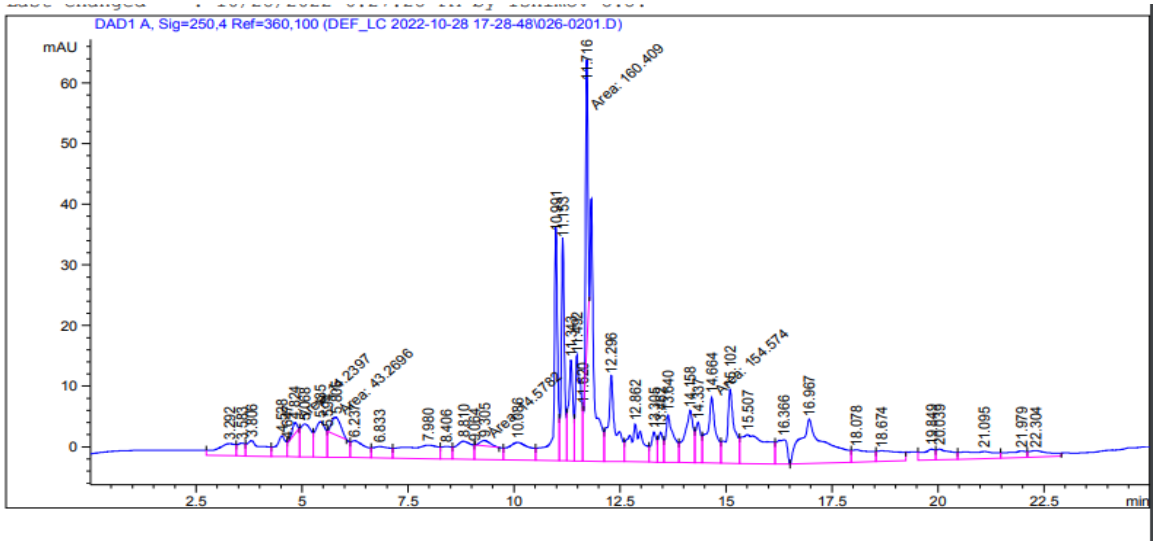


Figure 3. Chromatogram of vitamins contained in bitter watermelon seeds grown in hill.

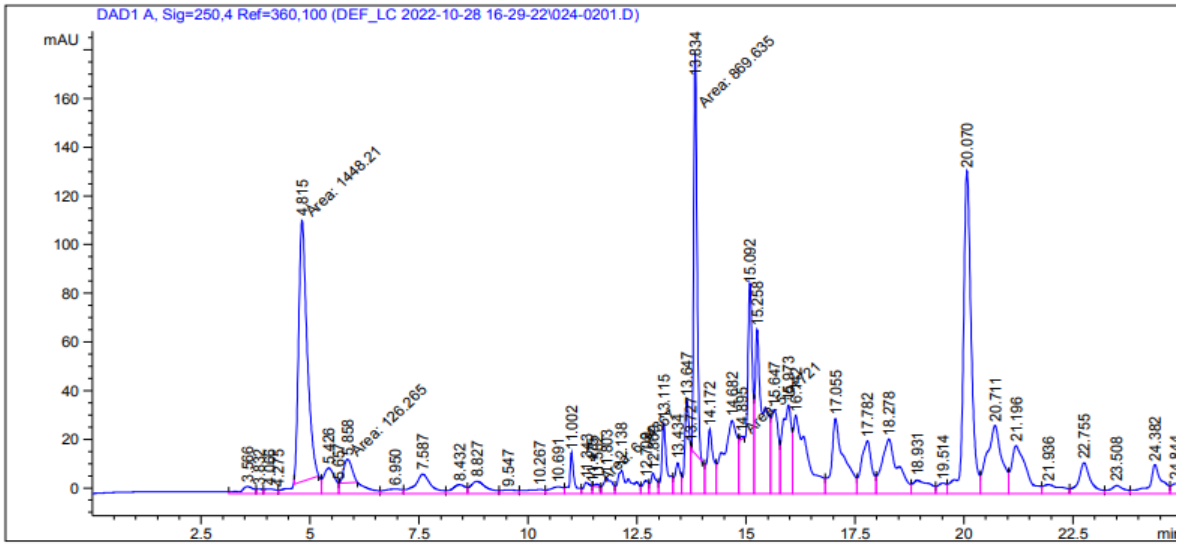


Figure 4. Chromatogram of vitamins in bitter watermelon juice grown in saline soil.

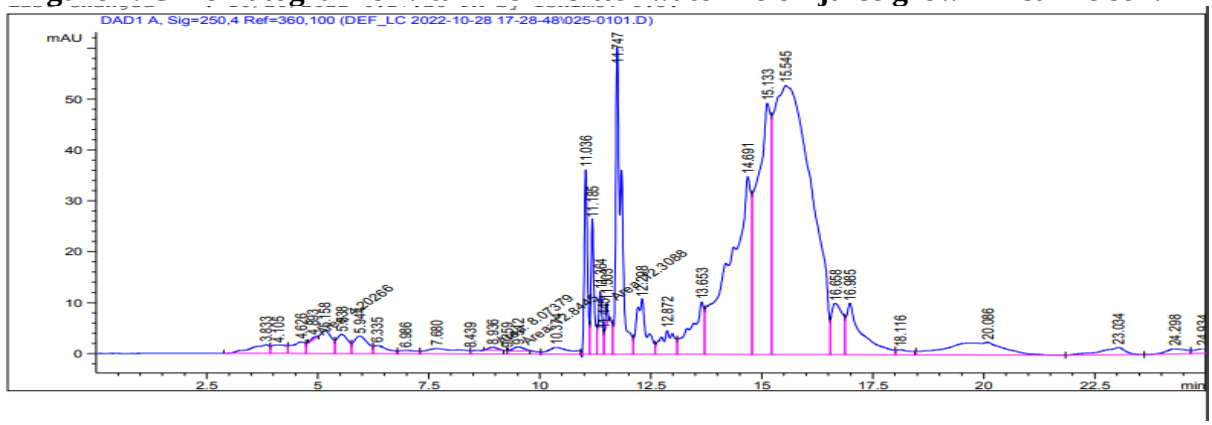


Figure 5. Chromatogram of vitamins in bitter watermelon seeds grown in saline soil.

Discussion of results. When the amount of vitamins in bitter watermelon was studied, it was found that the most common vitamin B_9 in the juice of bitter watermelon grown in hilly soil conditions is 148.120 mg/g, and B_6 is 3.8146 mg/g in its seeds. Among the rarest vitamins, it was found that PP is 0.047 mg/g in the juice and B_1 is 0.0382 mg/g in the seed.

When studying the amount of vitamins in bitter watermelon grown in saline soil conditions, it was found that the most common vitamin B_9 is 117.05 mg/g in the juice, and B_6 is 0.293 mg/g in the seed. Among the rarest vitamins, it was found that B_2 is 0.06 mg/g in the juice and B_1 is 0.021 mg/g in the seed.

From the table above, it was found that the amount of vitamins in the bitter watermelon grown in hilly conditions is higher than that of bitter watermelon grown in saline soil.

Bitter watermelon grown in Nigeria has been found to be rich in B_6, B_1 and vitamin C [13].

Vitamins and minerals play an important role in glucose metabolism. Certain vitamins and minerals act as antioxidants and help prevent diabetes and other problems that can occur as a side effect of diabetes.

Vitamins and minerals help to:

- Increase general immunity
- Reducing oxidative stress
- Keeping the blood sugar level within the prescribed range
- Prevent problems related to diabetes
- Diabetic nephropathy and neuropathy
- Prevent or reduce insulin resistance
- To prevent and fight against some diseases
- Prevention of brain development and neurological diseases
- Preventing the worsening of diabetes
- Enhance carbohydrate metabolism

Vitamins help to improve the overall immune system and prevent the development of diabetes.

Vitamin B_6, also known as pyridoxine:

- Vitamin B_6 helps to release sugar from stored carbohydrates in the body and convert them into energy.
- Improves nerve health, which prevents conditions such as diabetic neuropathy.
- It also reduces the risk of diabetic retinopathy.

Vitamin B9, also known as folate:

- Essential for proper cell division.
- It helps the formation of new cells.
- May lower homocysteine levels.
- Reduces the risk of cardiovascular disease in type 2 diabetics[13].

Conclusion. In conclusion, when comparing the amount of vitamins in bitter watermelon grown in Nigeria and Uzbekistan, it was found that bitter watermelon grown in Uzbekistan is higher. When the chemical composition of the bitter watermelon grown in the hilly regions of Uzbekistan was studied, it was found that it is richer in amino acids and vitamins compared to the bitter watermelon grown in saline soil conditions. This, in turn, shows that it improves human immunity and has beneficial properties in various diseases.

The large amount of vitamin B_6 in bitter watermelon seeds is important in the medicinal properties of the plant. We know that diabetics are more prone to glycation due to their high blood glucose levels. Glycation reactions can lead to cataracts, kidney failure and even Alzheimer's. A unique form of vitamin B_6 called pyridoxamine is known to interfere with toxic glycation reactions. Vitamin B_6 is a cofactor for approximately 150 reactions that regulate the metabolism of glucose, lipids, amino acids, DNA, and neurotransmitters. In addition, B_6 plays an antioxidant role by counteracting the formation of reactive oxygen species (ROS) and advanced glycation end products

(AGEs). Considering the many reactions in which vitamin B_6 is involved, its deficiency can lead to a number of clinically important diseases such as autism, schizophrenia, Alzheimer's, Parkinson's, epilepsy, Down's syndrome, diabetes and cancer [13;74-83-p].

References

1. По данным сайта GRIN (см. карточку растения)
2. МИРОНОВА А.Н. Руководство по проведению доклинических исследований лекарственных средств. // Под редакцией д.м.н. Часть 1-Москва: Гриф и К. —2012. —994с.
3. Modak M, Dixit P, Londhe J, Ghaskadbi S, Paul A, Devasagayam T. Indian herbs and herbal drugs used for the treatment of diabetes. J Clin Biochem Nutr. 2007;40(3):163–173. doi: 10.3164/jcbn.40.163.
4. Fallah Huseini H., Andalib S; Protective effect of *Citrullus colocynthis* (L.) Schard. fruit extract on high glucose-induced neurotoxicity in PC-12 cells. // J. Med. Plants. —2021; 20 (80)—60-68 p. —URL: http://jmp.ir/article-1-3109-en.html
5. Askarov I.R., Topvoldiev T., Mirzayeva Z.O. Chemical composition of bitter watermelon and determination of antioxidant activity of food additives based on watermelon // ACADEMICIA: An International Multidisciplinary Research Journal SJIF. —2022 = 8.252. — 60-67p. saarj.com. — doi:10.5958/2249-7137.2023.00059.9.
6. Memon U., Brohi A.H., Ahmed S.W. Antibacterial screening of citrullus colocynthis. // Pak. J. Pharm. Sci. 2003, 16, 1–6.
7. Marzouk B., Marzouk Z., Décor R. Antibacterial and anticandidal screening of tunisian citrullus colocynthis Schrad. // Medenine. J. Ethnopharmacol. 2009, 125, 344–349.
8. Kobaisy M., Tellez M.R., Webber C.L. Phytotoxic and fungitoxic activities of the essential oil of kenaf (hibiscus cannabinus L.) leaves and its composition. J. //Agric. Food Chem. 2001, 49, 3768–3771.
9. Yogeswari S., Ramalakshmi S., Neelavathy R. Identification and comparative studies of different volatile fractions from monochaetia kansensis by GCMS. // Glob. J. Pharmacol. 2012, 6, 65–71.
10. Duarte A., Luís Â., Oleastro M. Antioxidant properties of coriander essential oil and linalool and their potential to control Campylobacter spp. // Food Control 2016, 61, 115–122.
11. Herman A., Tambor K. Linalool affects the antimicrobial efficacy of essential oils. // Curr. Microbiol. 2016, 72, 165–172
12. Iverson F. Phenolic antioxidants: Health protection branch studies on butylated hydroxyanisole. // Cancer Lett. 1995, 93, 49–54.
13. Mirzayeva Z. O., Asqarov I. R., Topvoldiyev T. Achchiq tarvuz (citrullus colocynthis) tarkibidagi aminokislotalar va vitaminlar miqdorini aniqlash// Journal of Chemistry of Goods and Traditional Medicine J Chem Good Trad Med, Volume 2, Issue 2, 2023 74-83-b DOI: https://doi.org/10.55475/jcgtm/vol2.iss2.2023.174