The chemical composition of the leaves of the "white turnip" and "yellow turnip" varieties of turnip

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Abstract This study quantitatively compares the vitamin content in leaves of Brassica rapa L. (turnip) cultivars 'White turnip' and 'Yellow turnip' using the Yussch analytical method. The investigation focuses on water-soluble vitamin composition and its nutritional implications. As a result of the cited data, the fact that turnip has a rich vitamin composition, which is important in the Prevention of certain diseases and strengthening the immune system of the human body, has been widely covered on the basis of scientific sources. Analytical results demonstrate that 100 g of white turnip leaves contain: vitamins B_1 67.3 mg, B_3 15.5 mg, PP 21.16 mg, B_9 10.7 mg, C 2.36 mg, and B_2 4.36 mg. The sequence of decreasing vitamins is as follows: B_1> PP> B_3> B_9> B_2> C> B_6> B_{12}. Our next sample is B_3 61.1 mg, PP 12.9 mg, B_9 11.54 mg, B_2 14 mg, and C 10.5 mg in the 100 g yellow turnip leaf section. In this case, we can see vitamins B_3>B_2>PP>B_9>C>B_1>B_6>B_{12} in the order of decreasing.

1 Introduction

Turnip (Brassica rapa L.) is a biennial plant in the cabbage family, Cruciferae Brassica, one of the oldest cultivated vegetables in Asia. In many scientific research centers, scientific research is carried out on turnips and leaves. Several biologically active components are found in glucosinolates, isothiocyanates, phenolic compounds, flavonoids, organic acids, and vitamins [1]. Turnips contain B vitamins.

Turnip (Brassica rapa) has been used in folk medicine and traditional medicine since ancient times. Its roots, leaves, and seeds are rich in various substances that are beneficial to the human body. Turnip contains high levels of vitamin C, which strengthens the immune system and increases the body's ability to fight infections.

Turnip also cleans and heals the stomach, removes harmful toxins, normalizes bowel function, stimulates the metabolic process, strengthens the body's bone tissue, helps with joint pain, is recommended for asthma, severe cough, laryngitis, heart palpitations, insomnia, and diabetes.

Turnip (Brassica rapa L.) is a plant grown worldwide and serves as a source of nutrients and bioactive compounds. Many studies have focused on several compounds of turnip or parts of the plant. Setting up a complete chemical profile of various plant parts makes it

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easier to use them for nutritional and medicinal purposes. In Uzbekistan, 4 different varieties of turnip are grown [2].

“White Turnip” “Yellow Turnip”

Fig.1. White and yellow turnips.

This study focuses on two widely cultivated turnip (Brassica rapa L.) varieties in Uzbekistan - "white turnip" and "yellow turnip" - selected for their superior taste qualities and high consumption rates (Figure 1). Through standardized analytical methods, we determined the total content and composition of water-soluble vitamins in both varieties. The results provide a comprehensive nutritional comparison of these agriculturally important turnip cultivars grown under Uzbek conditions.

2 Experience part

The determination of the amount of water-soluble vitamins was practically increased in the high-efficiency chromatograph HPLC. Vitamin B12 is derived from “Rhydburg Pharmaceuticals” (Germany), vitamin C “Carl Roth GmbH” (Germany), B9 “DSM Nutritional Products GmbH” (Germany), B1, B2, B3, B6, PP vitamins “BLDPharm” (China). Water, acetonitrile, chemically pure brand acetic acid, and sodium hydroxide were used in HPLC-grade purity. In attracting the recognition of water-soluble vitamins in youth Tarki, the LC-40 Nexera Lite, produced by Shimadzu, was used with a high-performance thermal chromatograph. To extract vitamins that work in water, the sample to be examined was taken as 1 g, placed in a conical flask with a volume of 50 ml, and 25 ml of 0.1 n li HCl solution. Mixing takes 20 minutes at a temperature of 60 oC in a GT SONIC-D3 (Chinese) branded ultrasonic bath. The request mixture was cooled and filtered in the hamdaulchov flask with water to 25 ml. The extract was filtered and released into Viala in a 0.22 µm syringe filter with a content of 1.5 ml of ham used for analysis. Based on the total results obtained by the turnip leaf extract chromatogram (Figure 2), the amount of vitamins left by 100 g of leaves is calculated in Tables 1 and 2.

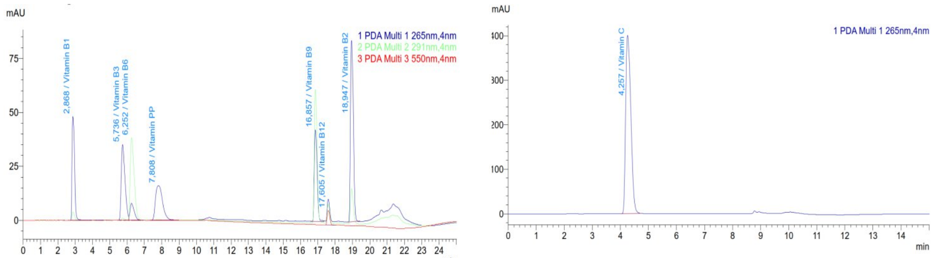

Fig. 2. Chromatogram of a standard solution of vitamins.

3 Discussion of the obtained results

The The vitamin content in leaves of turnip cultivars 'white turnip' and 'yellow turnip' was quantitatively analyzed and compared using the Yussch method. Chromatographic analysis of leaf extracts (Figures 3-4) enabled identification and quantification of vitamin compounds. Vitamin concentrations per 100 g of leaf material were calculated according to established analytical protocols, with complete results presented in tabular form below.

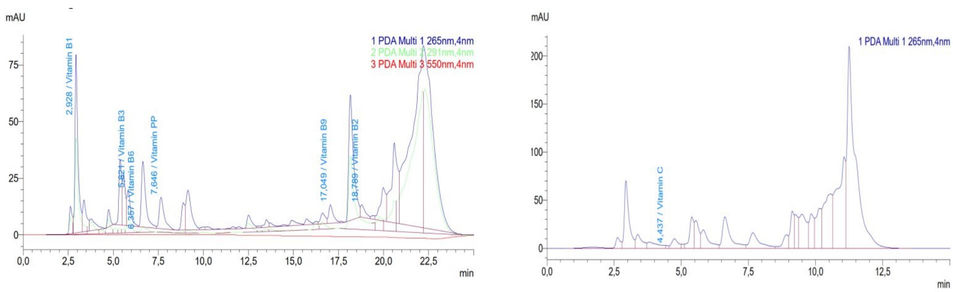

Fig. 3. Determination of vitamins in white turnip leaf extract chromatogram.

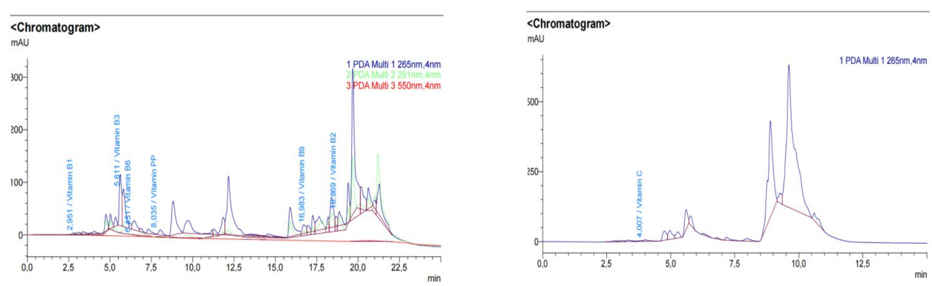

Fig. 4. Determination of vitamins in yellow turnip leaf extract chromatogram.

Table 1. The leaf "white turnip" is the amount of vitamins in the extract and the Times of its capture.

Vitamin	Intake time, sec	Concentration, mg / l	100 g sample quantity, mg
Vitamin B_1	2,928	26,922	67,305
Vitamin B_3	5,821	6,198	15,495
Vitamin PP	7,646	8,465	21,163
Vitamin B_9	17,049	4,28	10,700
Vitamin B_2	18,789	1,745	4,363
Vitamin B_6	6,357	0,092	0,230
Vitamin B_{12}	Detected	0	0,000
Vitamin C	4,437	0,946	2,365

Table 2. The leaf "yellow turnip" is the amount of vitamins in the extract and the Times of its capture.

Vitamin	Intake time, sec	Concentration, mg / l	100 g sample quantity, mg
Vitamin B_1	2,951	0,737	1,843
Vitamin B_3	5,811	24,448	61,120
Vitamin PP	8,035	5,17	12,925
Vitamin B_9	16,983	4,567	11,418
Vitamin B_2	18,869	5,612	14,030
Vitamin B_6	6,451	0,126	0,315
Vitamin B_{12}	Detected	0	0,000
Vitamin C	4,007	4,197	10,493

As can be seen from the tables above, 100 g of white turnip leaf contains vitamins B1 67.3 mg, B3 15.5 mg, PP 21.16 mg, B9 10.7 mg, C 2.36 mg, and B2 4.36 mg. The sequence of decreasing vitamins is as follows: B1>PP>B3>B9>B2>C>B6>B12. Our next sample is B3 61.1 mg, PP 12.9 mg, B9 11.54 mg, B2 14 mg, and C 10.5 mg in the 100 g yellow turnip leaf section. In this case, we can see vitamins B3>B2>PP>B9>C>B1>B6>B12 in the order of decreasing.

From the result of the experiment, we found that the turnip ildiz meva leaf contains the most B3vitamin. This vitamin, also called niacin, is one of the great nutrients for the human body. The most important role of this vitamin is to contribute to the energy production process. Our body uses enzymes called nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP) to convert carbohydrates, proteins, and fats from food to energy [3]. Vitamin B1, thiamine, one of the vitamins of Group B, has important functions for the body. The most common disease as a result of thiamine deficiency is Wernicke's encephalopathy. Vitamin B1 products should be added to the diet and consumed daily to prevent thiamine deficiency. In addition, vitamin B1 is a vitamin that promotes growth and development and is responsible for cell function. Its main function is to convert consumed foods into energy in the body [4].

Vitamin PP (nicotinic acid) was introduced in 1911 by K.It was isolated by Funk and found to be ineffective in treating beri-beri disease in pigeons. It was later added to the vitamins by a scientist named Goldoyerger after he discovered that pellagra treated the disease. The term Pellagra is Italian for pela agra - Ghadir - budir skin, in which dermatitis, diarrhea, and even dementia(weakening of the mind) are caused [5]. Folic acid is a natural form of vitamin B9, which is necessary for the body to maintain red and white blood cells (blood production), convert carbohydrates into energy (metabolism), and synthesize and store the body's genetic building blocks (DNA and RNA). Daily consumption of folic acid is also necessary to ensure a healthy pregnancy, to ensure normal fetal development, and to prevent some serious birth defects [6]. Vitamin B2 is one of the B complex vitamins, also known as riboflavin. Vitamin B2, which is necessary for our body, is a water-soluble vitamin that is not stored in the body. Therefore, it is important to take it regularly with food. Vitamin B2 is essential for energy production, cell growth and renewal, and the health of the eyes, skin, nervous system, and immune system [7].

Vitamin B6 (Pyridoxine) is mainly used as a stimulant in metabolism. It is a protein that is involved in the processing of amino acids and regulates protein absorption. Pyridoxine participates in the production of blood cells and the single supply of their color pigment - hemoglobin and glucose cells [8]. Vitamin C, one of the antioxidant vitamins, plays an important role in protecting against infectious diseases and cancer, strengthening the immune system. Therefore, it is important to consult a doctor to properly consume sources of vitamin C and prevent this vitamin deficiency. Vitamin C, also known as ascorbic acid, is a nutrient that has very important functions in the human body [9].

4 Conclusion

The water-soluble vitamin composition of turnip (Brassica rapa L.) leaves from the 'white turnip' and 'yellow turnip' cultivars was analyzed using the Yussch method. The quantitative analysis revealed distinct vitamin profiles: 100 g of white turnip leaf contains B1 67.3 mg of vitamins, B3 15.5 mg, PP 21.16 mg, B9 10.7 mg, C 2.36 mg and B2 4.36 mg, and 100 g of yellow turnip leaf portion contains B3 61.1 mg, PP 12.9 mg, B9 11.54 mg, B2 14 mg and C 10.5 mg. The results obtained show that the white turnip Leaf was found to contain large amounts of B1, PP, B3, and B9. Yellow turnip was found to contain high amounts of vitamin B3, PP, B9, B2, and C. These results demonstrate that white turnip leaves are particularly rich in vitamins B1, PP, B3, and B9, while yellow turnip leaves show higher concentrations of vitamins B3, PP, B9, B2, and C. Based on these findings, turnip leaves show potential therapeutic value for addressing vitamin deficiency-related conditions. Traditional medicinal applications suggest their usefulness in managing depression, anemia, pellagra, certain cancers, and vision disorders. The leaves may be consumed directly or prepared as decoctions to leverage their nutritional benefits.

This study provides a comparative analysis of the phytochemical composition between these two turnip varieties, offering scientific validation for their use in both nutritional and therapeutic contexts. The significant vitamin content supports their role in preventive healthcare and as complementary treatment options in folk medicine practices.

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