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ANTIRADICAL ACTIVITY OF FOOD ADDITIVES "ASKARUN" AND "ASKARUFEN"

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Zizifus jujuba, Ficus carica, Coriandrum sativum, Foeniculum vulgare, Askarun, Askarufen, antiradical activity

Abstract
In the article The results of studies conducted to assess the antiradical activity of newly developed medicinal food additives "Askarun" and "Askarufen" and their components using the inhibition method are described 2,2-diphenyl-1-picrylhydrazyl radical. It was found that the level of antiradical activity of the food supplement "Ascarun" is between the values of antiradical activity of fig fruits (Ficus carica L.) and jujube (Zizifus jujuba Mill.), which are part of its composition. The food supplement "Ascarufen", prepared from a mixture of jujube fruits, ground parts of coriander (Coriandrum sativum) and fennel seeds (Foeniculum vulgare Mill.), showed higher antiradical activity than these three plants. This once again proves that the composition of this food supplement is optimal.

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Introduction. Free radicals and related species have attracted much attention in recent years. They are mainly derived from reactive oxygen and nitrogen species [1, 2] . and are generated in our body by various endogenous systems, exposure to various physicochemical conditions or pathophysiological conditions. Free radicals can adversely alter lipids, proteins and DNA , which is the main cause of aging and the occurrence of a number of human diseases [3] .

The body's defense system against excess free radicals consists of the activity of oxidoreductase enzymes and various reactions of low-molecular antioxidants: chelate compounds, hormones, water- and fat-soluble vitamins, thiol-containing amino acids and polypeptides, flavonoids, carotenoids, etc [4]. Most of the listed compounds prevent the development of oxidative stress by interrupting the chain reaction of free radical formation, which is why these substances are called both substances with anti- radical activity and antioxidants . Fruit unabi (*Zizifus jujuba Mill.*) and fig (*Ficus carica L.)* are natural sources of the above-mentioned antioxidant substances and have high level of such activities.

It is known that A number of medicinal food additives have been obtained on the basis of a composition of jujube or fig fruits and parts of other plants [5, 6, 7, 8]. In this regard, the medicinal properties of food additives based on jujube and figs and with the addition of the above-ground part of coriander (*Coriandrum sativum)* [9, 10, 11] and fennel seeds (*Foeniculum vulgare Mill.) are of great interest.* [12], which are widely used in folk medicine. Given this, we studied the antioxidant activity *in vitro* parts of these plants and their mixtures in different proportions on the model of inhibition of adrenaline autooxidation [13]. On this basis, new food additives "Askarun" and "Askarufen" were developed, consisting of jujube and fig fruits, above-ground coriander and fennel seeds grown in the Fergana Valley of Uzbekistan.

This article describes the results of studies conducted to assess the antiradical activity of the food additives Askarun and Askarufen and their components.

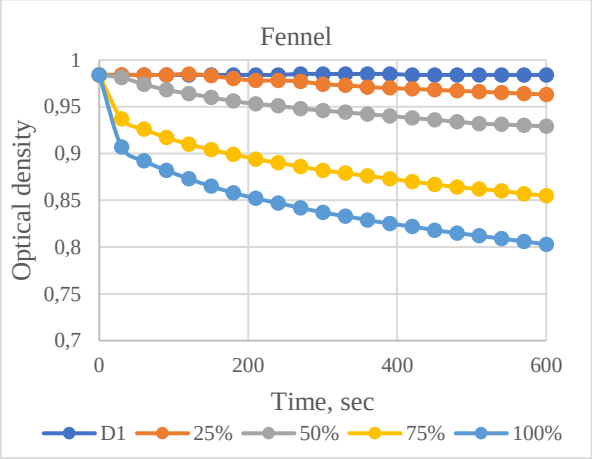
Materials and methods. Antiradical activity (ARA) of samples were assessed *in vitro* using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method [14] [15].

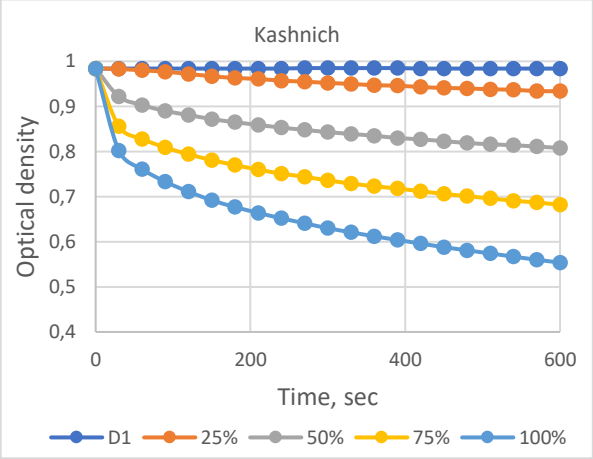
A solution of 0.812 mM DPPH• in ethanol was prepared in a 100 ml volumetric flask wrapped in aluminum foil and kept in the dark at room temperature for 30 minutes. 3 ml of the DPPH solution and 100 µl of ethanol (blank sample) were added to a 4 ml quartz cuvette with a thickness of 1 cm and the optical density (D_1) of the solution was measured at a wavelength of 517 nm every 30 seconds for 10 minutes using a YOKE (China) K7000 spectrophotometer.

To obtain an ethanol extract, 1 g of the sample was boiled in 25 ml of 96% ethanol in an ultrasonic bath at 100 W for 20 min in a 50 ml round-bottomed flask equipped with a reflux condenser. The extract was cooled and filtered through a syringe filter with a pore size of 0.45 µm and used for analysis. To assess the antiradical sample activity 25, 50, 75 or 100 µl of the sample extract was mixed with 3 ml of DPPH solution prepared in the above procedure and the optical density (D_2) was measured solution at a wavelength of 517 nm. Ethanol was added to the residue to bring the total volume of the solution in the cuvette to 3.1 ml. The antiradical activity of the samples was calculated as a percentage using the following formula:

$$ARA, \% = \frac{D_1 - D_2}{D_1} \cdot 100\%$$

Results and discussion. The obtained results are shown in Figure 1 and given in Table 1.





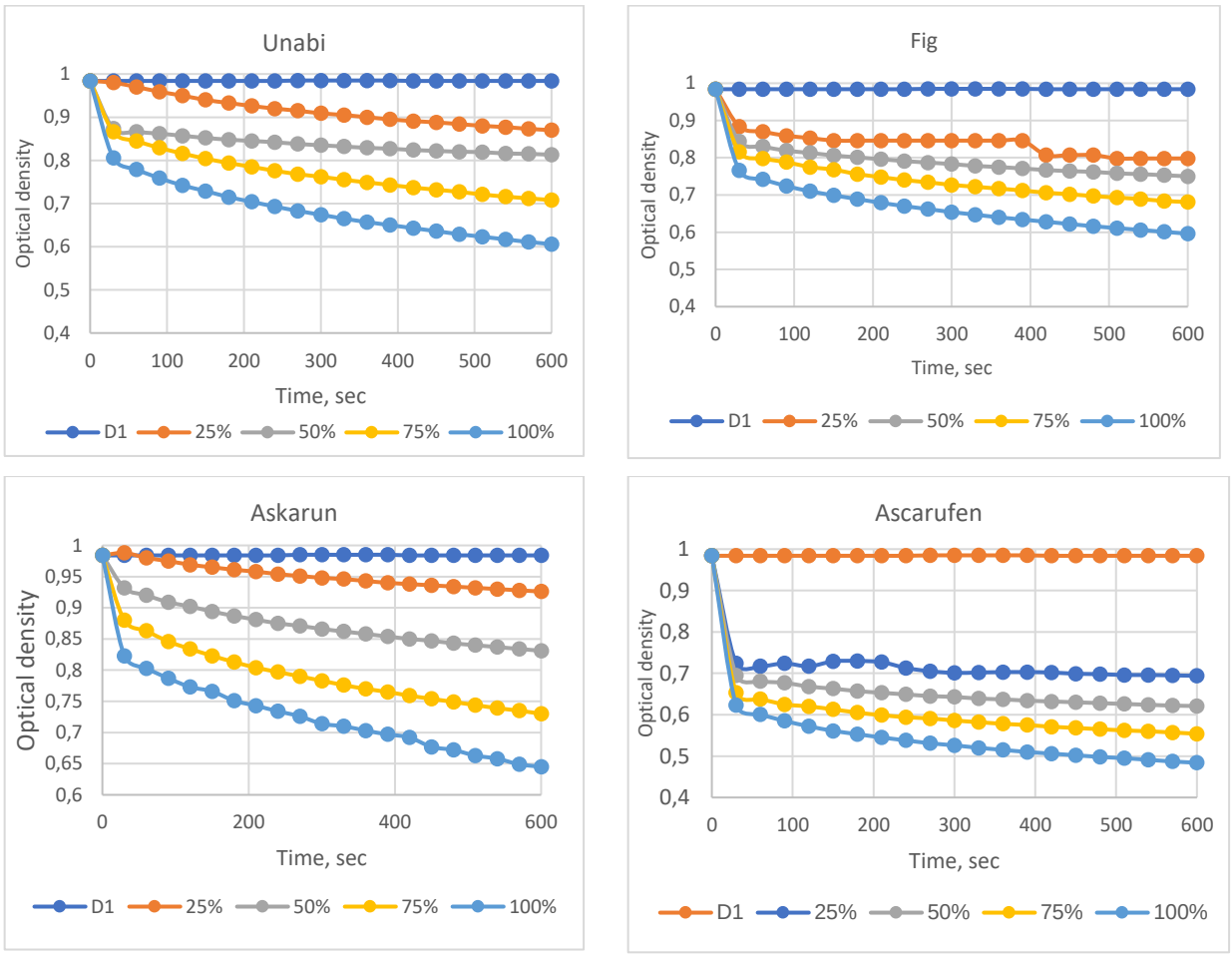


Figure 1. Graphs of the dependence of the optical density of the DF PG solution and solutions formed upon adding extracts of samples of different concentrations to it, depending on time.

Table 1.

Optical density and antiradical activity of a blank solution of DPPH and solutions of sample extract after 10 min.

Sample	D_1	D_2 (25 µl)	APA , %	D_2 (50 µl)	APA , %	D_2 (75 µl)	APA , %	D_2 (100 µl)	APA , %
Fennel	0.984	0.963	2.13	0.929	5.59	0.855	13.11	0.803	18.39
Kashnich	0.984	0.934	5.08	0.808	17.89	0.682	30.69	0.554	43.70
Unabi	0.984	0.87	11.59	0.813	17.38	0.708	28.05	0.606	38,41
And ngir	0.984	0.798	18.90	0.75	23.78	0.681	30.79	0.596	39.43
Askarun	0.984	0.926	5.89	0.831	15.55	0.73	25.81	0.645	34.45
Ascarufen	0.984	0.694	29.47	0.621	36.89	0.554	43.70	0.484	50.81

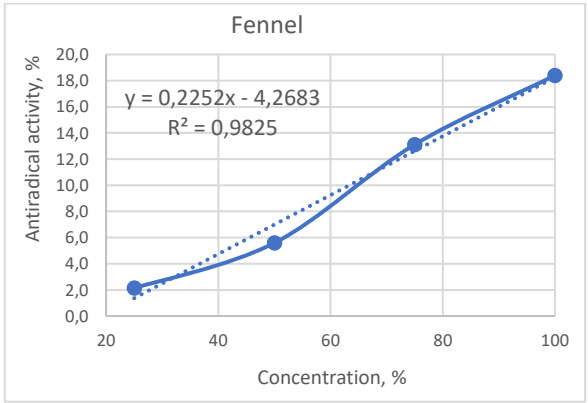
To determine the value IC_{50} of each test subject sample, i.e. the concentration of DPPH radical suppression in solution up to 50%, a graph of the dependence of antiradical activity (ARA,%) at 10 minutes on the sample concentration was constructed, as shown in Figure 2. Using the least squares method [16] determined the parameters *m* and *b* the closest straight line, which is described by the equation

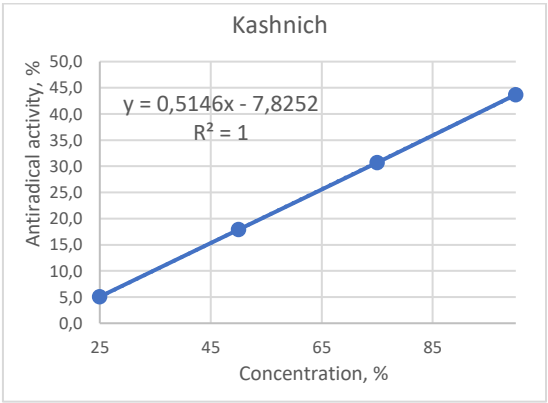
$$y=mx+b\ .$$

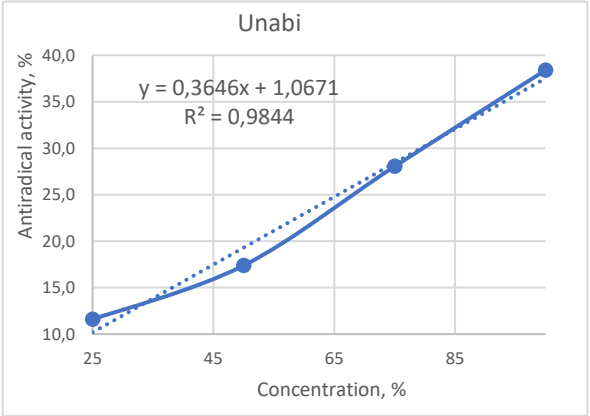
Here y *is* the antiradical activity, %; *x* is the concentration of the sample extract, %. Based on the established straight line function, we calculated concentration of the sample extract that satisfies the condition of antiradical activity *y* = 50%, i.e. *the* IC_{50} value according to the formula

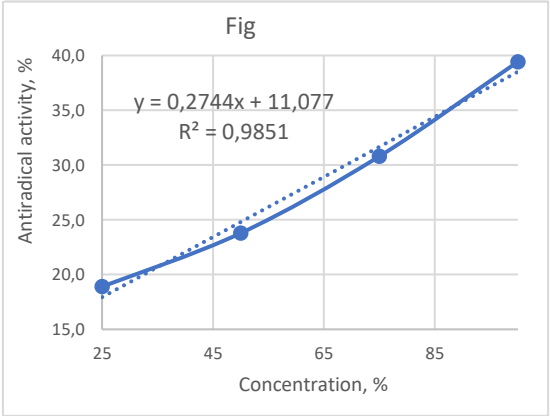
$$x=(y - b)/m$$

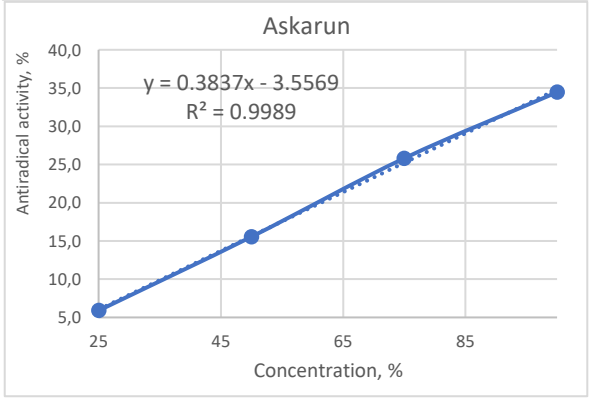
Table 2 shows the concentration-dependent antiradical activity at 10 minutes and *the* IC_{50} values for each of the samples tested. This table shows that the antiradical property of the extract prepared from fennel seeds showed the lowest result. The highest result can be seen in the above-ground part of the coriander plant. The food supplement "Ascarufen", prepared from parts of the plants jujube , coriander and fennel , showed a higher result than the antiradical activity of these three plants. This once again proves that the composition of this food supplement is optimal.











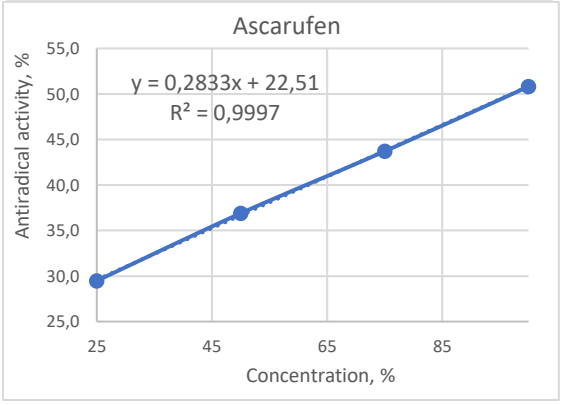


Figure 2. Points of dependence of antiradical activity of samples on their concentration at 10 minutes and the straight line function representing this dependence, and the degree of proximity of experimental points to the straight line R^2.

The analysis of the results presented in Table 2 shows that the value of the antiradical activity of the food additive "Ascarun" (IC_{50}=*139.58%*) is between activity values its components: fig (IC_{50}=*141.85%)* and jujube (IC_{50}=*134.21%*).

Table 2. Equation of the function of dependence of AR A of samples at 10 minutes on concentration and value IC_{50}, %, calculated on this basis .

Sample name	Trendline function formula	IC_{50}, %
Fennel	*y = 0.2252x - 4.2683*	240,98
Kashnich	*y = 0.5146x - 7.8252*	112,37
Zizifus jujuba	*y = 0.3646x +1.0671*	134,21
Fig	*y = 0.2744x +11.077*	141,85
Askarun	*y = 0.3837 x - 3.5569*	139,58
Ascarufen	*y = 0.2833x +22.51*	95,35

Conclusion. The conducted studies confirmed that the food additives "Askarufen" and "Askarun" have high antiradical activity and can be used in the prevention and treatment of diseases by inhibiting radicalization processes, which are the main causes of pathological changes in the body.

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