

STUDYING THE SPECIFIC ACTIVITY OF FERMENTED TEA FROM APPLE LEAVES

D.B.Tayirova*; K.B.Azimova**; K.A.Rakhimova***; O.U.Umarova****;
F.O.Eshmurodova*****

*Assistant,
Department of Biotechnology,
Tashkent Pharmaceutical Institute,
Tashkent, UZBEKISTAN

**Assistant,
Department of Biotechnology,
Tashkent Pharmaceutical Institute,
Tashkent, UZBEKISTAN

***Assistant,
Department of Biotechnology,
Tashkent Pharmaceutical Institute,
Tashkent, UZBEKISTAN

****Assistant,
Department of Biotechnology,
Tashkent Pharmaceutical Institute,
Tashkent, UZBEKISTAN

*****Assistant,
Organization of Pharmaceutical Work,
Tashkent Pharmaceutical Institute,
Tashkent, Uzbekistan
Email id: dilobartayirova@mail.ru

DOI: 10.5958/2249-7137.2023.00041.1

ABSTRACT

Fermentation affects the flavor of tea and generally softens its flavor by reducing astringency and bitterness, improving mouthfeel and aftertaste. Microbes can also produce metabolites that are beneficial to health. The specific activity (antimicrobial activity) of fermented teas determined by diffusion into agar on a dense nutrient medium by comparing the sizes of zones of inhibition of the growth of test microbes formed during the testing of solutions. antimicrobial activity of antimicrobial activity on the growth of strains of Pseudomonas aeruginosa, Escherichia coli, Bacillus subtilis, Staphylococcus epidermidis, fungi (Candida albicans), and 20 mm zones Staphylococcus aureus on the growth of yeast.

KEYWORDS: *Fermented Tea, Microbiological Fermentation, The Flavor Of Tea, Antimicrobial Activity, Apple Tree.*

INTRODUCTION

The fermented tea is a variety of tea that has undergone microbiological fermentation from several months to many years. Exposing the tea leaves to humidity and oxygen during the process also causes endo-oxidation (derived from the tea leaf enzymes themselves) and exo-oxidation (which is catalyzed by microbes). Tea leaves and the liquor made from them become darker when oxidized. Thus, various types of fermented teas produced throughout China are also called dark tea, not to be confused with black tea. The most famous fermented tea is pu-erh produced in Yunnan province.[7.4]

The fermented tea leaves change their chemical composition, affecting the organoleptic qualities of the tea made from them. Fermentation affects the flavor of tea and generally softens its flavor by reducing astringency and bitterness, improving mouthfeel and aftertaste. Microbes can also produce metabolites that are beneficial to health. In addition, substances such as ethyl carbamate (urethane) can be formed. Post-fermented tea usually becomes more valuable with age. Dark teas are often aged in bamboo baskets lined with bamboo leaves or in their original packaging. Many dark teas are aged in a humid environment to promote the growth of certain fungi, often referred to as "golden flowers" or jin hua (金花) because of their bright yellow color.

The leaves of the apple tree are whole, alternate, petiolate, and more often ovate, with a crenate or serrated edge, as a rule, pubescent on the underside. The flowers are simple or double, large (3-4 cm in diameter), on short pedicels, bisexual, from white to pale crimson in color, collected in several pieces mainly in corymbose inflorescences. The apple tree is a cross-pollinated plant, so pollinating varieties are needed. The fruit is a round-shaped apple (diameter mostly 5–12 cm, weight from 5–10 to 300–400 g) with juicy sour, sweet and sour or sweet pulp.

The beneficial properties of young apple leaves are the following effects: maintaining immunity and the health of the organs of vision; a positive effect on the functioning of the nervous system and the vital activity of cells; strengthening the heart and blood vessels; normalization of water, electrolyte and acid balance; ensuring muscle contraction; prevention of osteoporosis; prevention of anemia, diseases of the digestive tract. Means made from apple leaves are prescribed for gastritis and other diseases of the gastrointestinal tract, diseases of the respiratory system, insomnia, and pathologies of the kidneys and bladder. They can be used externally due to their anti-inflammatory effect on acne.[9.4]

Purpose of the Study

Technology for obtaining fermented tea and the study of the specific activity of fermentative tea from apple leaves.

Methods and Techniques

We received fermented tea with a biotechnological method. To get tea from the first, 1 kg of apple tree leaves were collected. Then they washed and cleaned unnecessary substances. After cooling, they were crushed by hand and wrapped in foxes in gauze, left for 3 hours so that the fermentation was successful. Then they were opened and dried on a lyophilic dryer at a temperature of 65-70 C.

The specific activity (antimicrobial activity) of fermented teas determined by diffusion into agar on a dense nutrient medium by comparing the sizes of zones of inhibition of the growth of test microbes formed during the testing of solutions [3,4,5]. For analysis, sterile Petri dishes of the

same diameter with a flat bottom are used. 20 ml of a nutrient medium of a certain composition, infected with an 18-20 hour culture of test strains (Staphylococcus Aureus, Escherichia Coli, Pseudomonas aeruginosa, Bacillus subtilis, Candida albicans, Staphylococcus epidermidis) are poured into cups installed on a horizontal table. Appropriate nutrient media are used for research.

Preparation of the inoculum: for the preparation of the inoculum, pure daily cultures of microorganisms grown on solid nutrient media are used. Select several of the same type, clearly isolated colonies. Loop transfer a small amount of material from the tops of the colonies into a test tube with a sterile 0.9% NaCl solution, bringing the density of the inoculum to exactly 0.5 according to the McFarland standard. The inoculum is used within 15 minutes of preparation.

Analysis: For the test, an infusion of Tea is prepared from the fruits and leaves of the apple tree on the frozen surface of the agar, and holes are made in the center with a glass cylinder. An infusion of Tea from the fruits and leaves of an apple tree is added to the wells in six Petri dishes.

Incubation: Cups are placed in a thermostat at a temperature of $(36 \pm 1)^\circ\text{C}$ for 18-24 hours. After incubation in a thermostat, the zones of inhibition of the growth of microorganisms are measured with a microbiological ruler with an accuracy of 1 mm. By the size of the zones, the microbiological activity of the tea infusion from the fruits and leaves of the apple tree is evaluated. The obtained data are statistically processed using the information program for Windows 21.

Results

After incubation in a thermostat, the zones of inhibition of the growth of microorganisms formed by the test solution were measured with a microbiological ruler with an accuracy of 1 mm. The microbiological activity of the test solution was assessed by the size of the zones. (picture-1 a and b)

The data obtained show that the infusion of Tea from the fruits and leaves of the apple tree does not have an antimicrobial effect on the growth of strains of Pseudomonas aeruginosa, Escherichia coli, Bacillus subtilis, Staphylococcus epidermidis, and Staphylococcus aureus, on the growth of yeast-like fungi (Candida albicans), the results of the experiment are shown in Table 2.

TABLE 2. ZONES OF INHIBITION OF MICROORGANISM GROWTH UNDER THE INFLUENCE OF FERMENTED TEA FROM APPLE LEAVES

<i>Solution</i>	<i>Microbial growth inhibition zones, mm</i>					
	Ps. aeruginosa	E. coli	Bac. subtilis	St. epidermidis	St. aureus	Candida albicans
infusion of tea from the fruits and leaves of the apple tree	–	–	–	–	20	–

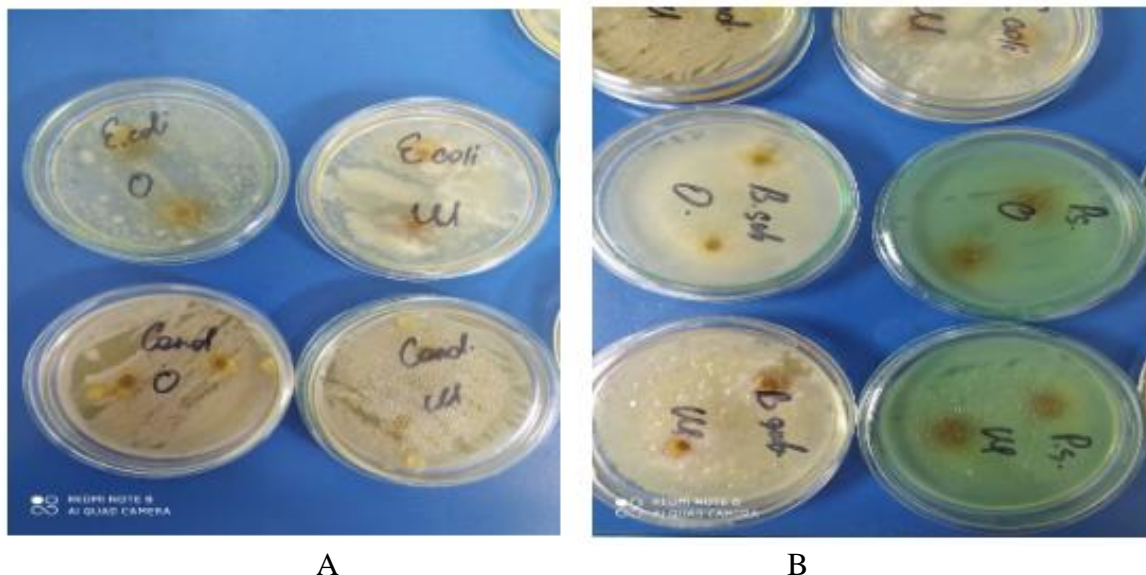


Fig. 1. Antimicrobial activity of fermented tea

CONCLUSION

From this, it can be concluded that the study of the antimicrobial activity of fermented apple leaf tea showed that tea does not have antimicrobial activity on the growth of strains of *Pseudomonas aeruginosa*, *Escherichia coli*, *Bacillus subtilis*, *Staphylococcus epidermidis*, fungi (*Candida albicans*), and 20 mm zones *Staphylococcus aureus* on the growth of yeast.

REFERENCES

1. "Determination of the sensitivity of microorganisms to antimicrobial drugs by the disk-diffusion method (guidelines)" No. 012-3 / 0093, Tashkent, 2007.
2. State Pharmacopoeia, XI edition, issue 2., Moscow "Medicine", 1990. - P.210-215.
3. State Pharmacopoeia of the Republic of Uzbekistan, I edition, part 2, Tashkent 2021. - P.1451-1453.
4. Characteristics and biochemical composition of kombucha-fermented tea. https://www.researchgate.net/publication/340647677_Characteristics_and_biochemical_composition_of_kombucha_-_fermented_tea_technological_features_of_the_production_of_fermented_drinks_using_kombucha.
5. Vorobieva V.M., Vorobieva I.S., Sarkisyan V.A., Frolova Yu.V., Kochetkova A.A. Nutrition issues. Volume 91, No. 4, 2022 115-120.
6. Fermented Foods and Beverages. Dimitrios A. Anagnostopoulos and Dimitrios Tsaltas. Innovations in Traditional Foods. 2019, Pages 257-291.
7. Microbiological safety of traditionally processed fermented foods based on raw milk, the case of Mabisi from Zambia. Sijmen Schoustra, Charlottevander

Zon, Anneloes Groenenboom, Himoonga Bernard Moonga, John Shindano, Eddy J. Smid, Wilma Hazeleger. LWT Volume 171, 15 December 2022, 113997.

8. Fermentation quality evaluation of tea by estimating total catechins and theanine using near-infrared spectroscopy. Suming Chen, Ching Yin Wang, Chao Yin Tsai, I. Chang Yang, Sheng Jie Luo, Yung Kun Chuang. 115, [103278]. <https://doi.org/10.1016/j.vibspec.2021.103278>.