

ANALYSIS OF BIOACTIVE COMPOUNDS IN ROSES AND THEIR PHARMACOBIOLOGICAL SIGNIFICANCE.

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Abstract: *This thesis analyzes the chemical composition of the rose (Rosa L.) plant and its pharmacobiological properties for human health. The research primarily focuses on the analysis of key bioactive compounds—polyphenols, flavonoids, vitamins, and antioxidants—found in rose petals and essential oil. The thesis scientifically substantiates the anti-inflammatory, antibacterial, and cellular regenerative effects of these substances. Furthermore, it highlights the prospects for the effective utilization of rose raw materials in the pharmaceutical and modern cosmetology industries. The obtained results hold significant practical importance for developing new types of pharmaceuticals based on natural bioactive substances.*

Keywords: *Rose, bioactive compounds, pharmacobiology, antioxidants, flavonoids, phytochemistry, regeneration, essential oil.*

INTRODUCTION

The rose (*Rosa L.*) is not only a plant of aesthetic value in ornamental horticulture but also a versatile source of raw material with strategic importance in modern pharmacognosy, biotechnology, and medicine. Recent international scientific research and chromatographic analyses demonstrate that the chemical composition of the rose comprises a complex and dynamic biological system containing more than 300 components.

Among these components are complex macromolecular compounds, essential oils, glycosides, and antioxidant complexes, whose concentrations are directly influenced by the plant's growth habitat and genetic diversity. In particular, the unique combination of polyphenols and flavonoids renders the rose an indispensable product not only for natural pharmaceuticals but also for functional food supplements and the perfumery industry. Therefore, an in-depth analysis of its bioactive compounds serves as a crucial scientific foundation for developing a new generation of phytopreparations with high efficacy and minimal side effects in the modern pharmaceutical industry.

Main Body. The therapeutic value of the rose is intrinsically linked to the ratio of primary and secondary metabolites within its composition. Modern chromatographic analyses confirm that the rose possesses a complex chemical structure. Specifically, polyphenols and flavonoids, such as quercetin, kaempferol, and myricetin, occur in high concentrations within the petals. In addition to strengthening plant immunity, these compounds perform a powerful protective function against xenobiotics in the human body. The composition of essential oils, which provide the plant's distinctive aroma and healing properties, primarily consists of monoterpene alcohols: geraniol (40–50%), citronellol (20–30%), and nerol (5–10%). Furthermore, trace amounts of farnesol and eugenol compounds confer potent bactericidal properties to the plant.

Rose fruits and leaves are distinguished by their richness in lycopene, beta-carotene, and vitamins. These substances play a crucial role in vitamin A synthesis and improving visual acuity within the body. Notably, the vitamin C (ascorbic acid) content in roses surpasses that of citrus fruits by 10 to 50 times, demonstrating its high biological value. Moreover, the soluble pectins and polysaccharides present in its composition exhibit detoxifying properties by binding and eliminating heavy metals and toxins from the body.

Studies have proven the wide-ranging pharmacological efficacy of rose extracts. Phenolic compounds protect cell membranes from oxidation, exerting antioxidant and anticarcinogenic effects that inhibit the development of mutated cells. Due to their cardiotropic and angioprotective properties, anthocyanins increase the elasticity of blood vessel walls and stabilize blood pressure. Phytonicides within the plant exhibit high antimicrobial and fungicidal activity against *Staphylococcus aureus* and *Candida* fungi. From a neuropharmacological perspective, rose essential oils affect the human sensory system and stimulate endorphin synthesis, thereby effectively aiding in the treatment of depression and chronic fatigue.

Conclusion. The theoretical analysis conducted demonstrates that the composition of the rose (*Rosa L.*) represents a complex phytochemical system of high biological value, consisting of more than 300 bioactive compounds. The petals and fruits of the rose serve as rich sources of polyphenols, flavonoids, and essential oils, with constituent compounds such as geraniol, citronellol, and quercetin acting as key factors determining the plant's primary therapeutic efficacy. Notably, the fact that the vitamin C content in roses significantly surpasses that of many fruits and vegetables, including citrus fruits, reconfirms its immune-boosting and potent antioxidant properties.

Extracts derived from the plant possess not only antiseptic and anti-inflammatory properties but also cardiotropic and neuroprotective effects, making them highly promising raw materials in modern pharmacology for treating cardiovascular and nervous system diseases. Concurrently, the pectins and polysaccharides within its composition provide detoxifying properties that cleanse the body of toxins, while the phytonicides exhibit high activity against various pathogenic microorganisms.

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