



OPTIMIZATION OF THE TECHNOLOGY FOR HEPATOPROTECTIVE HERBAL TEA

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Relevance: In recent years, the prevalence of liver and biliary tract diseases in the Republic has steadily increased: approximately 15–17% of the adult population suffers from various hepatic pathologies. The etiology and pathophysiology of these diseases are complex, and their treatment requires polyvalent agents capable of acting through several mechanisms (antioxidant, anti-inflammatory, cytoprotective, regenerative). Herbal preparations derived from medicinal plants are considered a promising direction in hepatoprotection. At the same time, the scientific substantiation, optimization, and technological development of local plant resources are necessary. The present work is devoted to creating a scientifically validated herbal composition the hepatoprotective tea “*HEPASILIMARIN*” — from local raw materials, and to evaluating its technological parameters and quality characteristics in order to meet the pharmaceutical need for effective preparations.

The aim of the study: To develop an optimized formulation and production technology of the hepatoprotective herbal tea “*HEPASILIMARIN*” based on local medicinal plant raw materials, and to determine its quality indicators and hepatoprotective potential.

Materials and methods: Monitoring of local and cultivated medicinal plant species was conducted (samples collected in 2022, Bostanliq district, Tashkent region). Resource-indexing and expert ranking methods (according to A.Ya. Kobzar and O.M. Gritsenko) were used to classify and prioritize the plants by pharmacological groups. Propensity indices were calculated for each pharmacotherapeutic group (antioxidant, anti-inflammatory, hepatostimulant, etc.). Five experimental mixtures (№1–№5) were prepared, and their hepatoprotective effect was assessed in laboratory animals by measuring biochemical markers ALT and AST ($\mu\text{mol}\cdot\text{s}\cdot\text{L}$). The herbal tea technology included: primary cleaning of raw materials, drying (30–90 °C depending on species), grinding (mill, maize particle size — 3–7 mm), sieving (7 mm and 0.2 mm mesh), mixing (mechanical mixer), and packaging into filter sachets (3.0 g).

Results: According to resource-indexing, the calculated propensity indices (g) by pharmacotherapeutic groups were: antioxidant — 0.8; anti-inflammatory — 0.8; hepatostimulant — 0.4; auxiliary groups (cell regeneration, fibrosis inhibitors, membrane stabilizers, vitamin carriers, sedatives)—0.2 g each; total 3.0 g. Biochemical analysis of the experimental mixtures (№1–№5) demonstrated that formulation №4 showed the most pronounced hepatoprotective effect: ALT = 2.6 ± 0.3 ; AST = 1.2 ± 0.1 ($\mu\text{mol}\cdot\text{s}\cdot\text{L}$). Therefore, formulation №4 was selected as the basis for “*HEPASILIMARIN*.”

The optimized nominal composition of “*HEPASILIMARIN*” (per sachet = 3.0 g) was: *Silybum marianum* seeds — 1.2 g; *Mentha piperita* leaves — 0.6 g; *Zea mays* stigmas — 1.2 g. Packaging into 3.0 g filter sachets was recommended. Quality control of the technological process and finished product confirmed compliance with the State Pharmacopoeia (SP I, SP XI) standards: moisture — $10 \pm 1.2\%$ (norm <13%), total ash — $9.25 \pm 0.6\%$ (norm <10.5%), acid-insoluble ash — $3.15 \pm 0.4\%$ (norm <5%). Microbiological parameters and heavy metal content were within permissible limits. Particle size distribution and absence of foreign admixtures confirmed suitability for packaging.



Conclusions. A scientifically substantiated optimized formulation and production technology for the hepatoprotective herbal tea "*HEPASILIMARIN*" has been developed using local medicinal plant resources. Resource-indexing and expert ranking methods allowed the selection and optimization of plant combinations; formulation №4 demonstrated the strongest normalizing effect on ALT and AST values. The main quality indicators of the finished product complied with the requirements of the State Pharmacopoeia; the tea was standardized for packaging into 3.0 g filter sachets.