

ACUTE TOXICITY OF THE BUTANOL EXTRACT OF LAGOCHILUS SETULOSUS

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Abstract

This study aimed to evaluate the acute toxicity of the butanol extract obtained from the aerial parts of *Lagochilus setulosus*. The plant material was collected in Tashkent in 2024 and taxonomically identified at the Institute of the Chemistry of Plant Substances, Uzbekistan. The crude methanol extract was fractionated successively with chloroform, ethyl acetate, and n-butanol to obtain the test sample.

Acute toxicity was assessed on outbred white male mice (19–21 g) under laboratory conditions. The extract was administered orally at doses of 500, 1000, 3000, 8000, 10000, and 12000 mg/kg. The animals were monitored for 14 days to record behavioral changes and mortality. The median lethal dose (LD₅₀) was calculated using the Litchfield–Wilcoxon method.

The results showed dose-dependent toxic effects. At lower doses, an increase in locomotor activity and heart rate was observed, while higher doses led to depression of the central nervous system, reduced motor activity, shallow respiration, tremor, and mortality. The LD₅₀ value of the butanol extract was determined to be 10600 mg/kg (9217–12190 mg/kg). According to GOST 12.1.007-76 and A.V. Stefanov's classification, the extract is classified as low-toxic (Class III) and practically non-toxic (Class V).

Keywords: Extraction, diterpenoids, alkaloids, toxicity, expectorant, anti-inflammatory, tonic activity.

Introduction

The genus *Lagochilus* is one of the most widely represented genera in the Lamiaceae family. More than 18 species grow in the territory of Uzbekistan. A representative of this genus, *Lagochilus setulosus*, is a perennial plant with woody stems at the base, thin, straight, glabrous or bristly, later becoming whitish and shiny, 30–80 cm in height.

The leaves are rhomboid or broadly ovate, deeply dissected or divided, with shortly pointed lobes lacking sharp apices; glabrous, with long, narrowly winged petioles (shorter in the upper leaves). Flowers are sessile, 4–6 in the axils of upper leaves. Bracts are thin, spiny, needle-like. The calyx is narrowly bell-shaped with narrow triangular spiny teeth. The corolla is white with brown spots, 2.3–3 cm long. Flowering occurs from May to September [1].



Various groups of biologically active compounds have been identified in *Lagochilus* species. The aerial parts of *L. setulosus* contain diterpenoids, alkaloids, tannins, vitamins, flavonoids, carbohydrates, and organic acids [2].

In traditional medicine, *L. setulosus* is used as an expectorant, anti-inflammatory, tonic, antispasmodic, hemostatic, and sedative agent. In experimental studies, its infusion increases heart rate [3].

Materials and Methods

The plant material of *L. setulosus* was collected during the flowering phase in 2024 in Tashkent. The species was identified by PhD O.M. Nigmatullaev at the Laboratory of Medicinal and Technical Plants of the Institute of the Chemistry of Plant Substances named after Academician S.Yu. Yunusov (herbarium number 50.236431).

The air-dried aerial parts of the plant (1 kg) were crushed and extracted with methanol at room temperature. After vacuum evaporation, a crude extract (445 g) was obtained, which was suspended in water (5 L) and sequentially fractionated with chloroform, ethyl acetate, and n-butanol.

Experimental Part

The acute toxicity of the butanol extract of *L. setulosus* was evaluated on laboratory animals. Experiments were carried out on outbred white male mice weighing 19–21 g, maintained under standard vivarium conditions in accordance with the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (Strasbourg, 1986) [4].

The test substance was administered orally using an atraumatic metal probe at doses of 500, 1000, 3000, 8000, 10000, and 12000 mg/kg in the form of a 20% aqueous solution. Each dose was tested on 6 animals. The animals were observed for 14 days after a single administration. The median lethal dose (LD₅₀) was determined using the Litchfield and Wilcoxon method [5].

Results and Discussion

At doses up to 8000 mg/kg, increased locomotor activity and elevated heart rate were observed in animals.

At a dose of 8000 mg/kg, depression of general condition, reduced motor activity, shallow respiration, and decreased response to external stimuli were noted.

At a dose of 10000 mg/kg, a pronounced deterioration of the condition and tremor were observed; death of one out of six animals occurred within 64 minutes.

At a dose of 10600 mg/kg, 50% mortality was recorded.

Table 1 Comparative acute toxicity of the butanol extract of *L. setulosus*

No	Test substance	Animal species	Route of administration	Median lethal dose (LD ₅₀)
1	Butanol extract of <i>L. setulosus</i>	Mice	Oral (intra-gastric)	10600 (9217÷12190)
2	Diclofenac sodium	Mice	Oral (intra-gastric)	350 (312,5±392,0)



Conclusion

The median lethal dose (LD₅₀) of the butanol extract of *L. setulosus* upon oral administration is 10600 (9217–12190) mg/kg. Thus, according to GOST 12.1.007-76, the extract belongs to low-hazard substances (Class III), and according to the classification of A.V. Stefanov, it is considered practically non-toxic (Class V) [6].

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