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Risks Assessment of Gold Nanoparticles Exposure for the Soil-Plant-Consumer System

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Extensive production and application of gold nanoparticles leads to contamination of aquatic and terrestrial ecosystems, creating risks for consumers of plant products. The effects of gold nanoparticles in concentration range of 1-100 mg/L applied in two routes on *Mentha spicata* L. plants, soil and human health was investigated. k₀-neutron activation analysis was used to determine gold content in soil and plant segments and atomic absorption spectroscopy to determine its concentration in herbal remedy. Plants watering with 100 mg/L of gold nanoparticles contributed to accumulation of gold in soil (up to 1769 mg/kg) and root system (up to 454 mg/kg) and reduced the activity of soil microbiota by 28% compared to the control. Foliar application resulted in maximum gold uptake by leaves (552 mg/kg) and stems (18.4 mg/kg). Nanoparticles affected the content of chlorophyll and carotenoids in *Mentha spicata* L. leaves and led to an increase in antioxidant activity. High gold extraction from leaves into infusion indicates a risk of trophic transfer, and decreased soil microbiota activity points at the potential harmful effect of nanoparticles.

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