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RESEARCH ARTICLE

Influence of various concentrations of uranium mining waste on certain growth and biochemical parameters in gram

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SUMMARY

The importance of plants is continuously increasing for clean up of contaminated and polluted ecosystems with radioactive metals. Importance of gram for the purpose is very limited in the literature. In the present investigation effects of different uranium tailing concentrations (25, 50, 75 and 100%), conditioned with soil were studied on *Cicer arietinum* L. by analysis of various growth (shoot-root length, shoot-root fresh weight, shoot-root dry weight, seed number plant^{-1} and seed weight plant^{-1}) and biochemical parameters (chlorophyll contents and soluble leaf proteins). All the growth parameters and chlorophyll contents showed gradual but significant decrease with an increase in tailing concentration. Soluble protein (leaf) level showed maximum increase at 75 per cent tailing concentration. Plant material was not found sufficient at 100 per cent tailing concentration for analysis of any growth and biochemical parameter. Survival of gram plants over 80 days on higher tailing concentrations (up to 75%) shows that it may be helpful for revitalization of uranium mining waste.

Key Words : Uranium, Tailing, *Cicer arietinum* L., Growth parameters, Biochemical parameters, Phytoremediation

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Uranium is naturally occurring radioactive element. Comparatively little information is available with respect to uranium in soils. Its average concentration in earths crust is 4 mg kg^{-1} (Hursh and Spoor, 1973). The world wide data summarized by Kabata-Pendias and Pendias (1984) give uranium values in a narrow range of 0.79 to 11 mg kg^{-1}. Though the level of uranium in soils is generally low, in LOCAL areas it may exceed due to fission by products of nuclear testing and reactor operations (Entry *et al.*, 1996; Fuhrmann *et al.*, 2004), improper waste storage practices (Jones and Serne, 1995; Liator, 1995), agricultural practices (Rossler *et al.*, 1979; Aery and Jain, 1998) and uranium tailings (Sheppard and Thiabault, 1984; Jagetiya and Purohit, 2006; 2007).

The tailings are large quantities of waste material, result of mining and milling. These consist of overburden from strip and open pit mines as well as by products from the ore proceed in milling facilities (Hossner *et al.*, 1998). The tailings are disposed at a place known as tailings dam or tailings impoundments (Jain, 1996).

Even if the tailing site is physically secure against wind or water erosion, intrusion by flora and fauna, earthquakes and chemically secure against contamination of surrounding soils, surface waters or ground waters, the retention emanating from the tailings may still give rise to an unacceptable risk to the LOCAL environment and nearby communities compared to pre-mining conditions because uranium ores and therefore, the tailings are often associated with elevated concentrations of heavy metals, giving rise to the potential for chemical toxicity from surface water or ground water contamination.

Umra mine (Udaipur, India) was in operation between years 1957 to 1962 in the form of exploratory mine (Jain, 1996).

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