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NOVEL SOLUTION TO IMPROVE THE MOSS BAG TECHNIQUE IN ENVIRONMENTAL BIOLOGICAL MONITORING

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Abstract

Low doses of radiation can stimulate growth in plants in general and in mosses in particular and thereby enhance the ability of mosses to absorb airborne elements in the moss bag technique. The effect of low-energy X-ray radiation on the growth of *Barbula indica* moss was experimentally investigated with 20 doses of 1 to 20 Gy with a 1 Gy increment. The results showed that doses from 2 to 16 Gy improved the growth of moss compared to non-irradiated control samples and that the 14 Gy dose provided the optimal stimulation in terms of morphological characteristics, weight gain, and total chlorophyll content of the phyllids in the treated moss. The 14 Gy dose was chosen to irradiate moss that was exposed to the monitoring environment. The concentrations of the elements absorbed from the air were measured using the total reflection X-ray fluorescence technique for irradiated, non-irradiated, and native moss samples. The results showed that irradiated moss had a significantly higher ability to absorb elements from the air than non-irradiated moss, but the absorption was generally lower than for native moss. Our findings show that low-dose (14 Gy) radiation treatment of mosses is promising as an effective method to improve the accuracy of environmental monitoring by the moss bag technique.

Key words: airborne elements, irradiated moss, low-energy X-ray, moss growth

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