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## Natural radionuclides uptake into alfalfa grown in soil amended with phosphogypsum

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The source of agricultural phosphorus is the phosphate fertilizer, which can be contaminated with natural radioactivity and metals originally present in the phosphate rock used as raw material. Since the phosphate rock presents low solubility in water, it is a common practice to attack the raw material with acid in order to enhance the availability of phosphate to the soil. During the chemical attack, usually by sulphuric acid, all the chemical species, including heavy metals and the radioactive elements, are distributed among the final products of the reaction: phosphoric acid and calcium sulphate (phosphogypsum). Phosphogypsum has been widely used in Brazil as soil conditioner. This paper aims to evaluate the radiological environmental impact of successive applications of phosphogypsum in soil used for the grown of alfalfa, through the determination of the transfer factors of the radionuclides (U-238, Ra-226, Pb-210, Th-232 and Ra-228). The study was conducted at Embrapa Pecuária Sudeste, in Sao Carlos-SP, Brazil (22°01' S and 47°54' W; 856 m above sea level). The soil is a typical Haplurtox on which an irrigated alfalfa (*Medicago sativa* cv. *Crioula*) pasture had been intensively grown for 2 years. The forage was managed under rotational system with a one day-grazing period and 30 days between the cycles throughout the year. The experimental plots were set up inside the paddocks. Gypsum treatments comprised: control 1.5, 3 and 6 t per ha. Lime was added to the soil to give a base saturation of 80%. Phosphorus and potassium fertilizers were applied to all plots. Gypsum effects were evaluated during 24 alfalfa growth cycles. The results obtained for the transfer factor on alfalfa grown in typical Brazilian soil did not show significant variations caused by addition of phosphogypsum in concentration until three times the recommended dose.