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Elaboration of a phosphocalcic amendment based on slaughterhouse waste and evaluation of its effects on the morpho-physiological and chemical profile and on the biological activities of *pelargonium graveolens* (L)

Abstract :

The management of slaughterhouse waste, particularly bone waste represents a major environmental challenge for the agri-food industry in Morocco. In this context, the aim of this thesis is to elaborate a phosphocalcic amendment (PC) based on this waste and to examine their impact on the physico-chemical properties of the soil, morpho-physiological characteristics, phytochemical traits and biological activities of *Pelargonium graveolens*, an aromatic and medicinal plant renowned for its essential oils with a variety of properties.

To achieve this, a regular mixture of bovine (OB), ovine (OO) and poultry (OV) bones was physically treated to obtain a phosphocalcic material in powder form, then characterized by mineralogical and structural analyses. Its effect on the soil and on *Pelargonium graveolens* was then assessed in pot experiments carried out over a period of 8 months, with contents varying from 1 to 30 t/ha.

The characterization of the bone material confirmed that it was rich in phosphorus and calcium, which led to its use as a phosphocalcic amendment in accordance with standard NF U44-021 (AFNOR 1981). Its application to the soil improved its physico-chemical properties in terms of pH, electrical conductivity (EC), concentration of assimilable phosphorus (P2O5) and bioavailable nutrients. Monitoring of the morpho-physiological characteristics of *Pelargonium graveolens* plants revealed a positive effect of the PC amendment, with notable improvements in plant height, fresh and dry weight, and chlorophyll content. The PC amendment also had an impact on the chemical composition of *Pelargonium graveolens* essential oils (EO), with an increase in some active compounds such as citronellol and geraniol, and the disappearance of others. However, these oils have significant antioxidant and antimicrobial activity against *Staphylococcus aureus* and *Bacillus subtilis*. They also have anticorrosive properties, with maximum inhibition efficiency at an EO inhibition concentration of 1 g/L. This indicates their potential for various applications.

Key Words : agronomic valorization, slaughterhouse waste, bone materials, phosphocalcic amendment, *pelargonium graveolens*, essential oils, biological activities, anticorrosive activity