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POTENTIAL OF BIOFILM TREATED K-FELDSPAR AS A BIO-MINERAL FERTILIZER IN ORGANIC AGRICULTURE

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Being one of the essential macronutrients for plants, potassium (K) plays a vital role in plant growth and health. In organic agriculture, we cannot use any chemical inputs; therefore, K-rich minerals like K-feldspar will be suitable for replacing muriate of potash (MOP). Unfortunately, K-feldspar is not capable of releasing a sufficient amount of K due to its lower solubility. In the present study, K-feldspar was treated with a biofilm formulation (BF) developed from soil fungi and bacteria to form a bio-mineral fertilizer, i.e. Biofilm-feldspar, and analyzed for its solubility. Here, six treatments *viz.* (a) feldspar, (b) Biofilm-feldspar, (c) autoclaved (121 °C) Biofilm-feldspar, (d) heat-treated (200 °C) Biofilm-feldspar, (e) MOP, and (f) control (no fertilizer) were compared in a leaching column experiment up to four weeks. Results show that the Biofilm-feldspar released K (ca. 100 ppm) comparable to MOP at the end of four weeks, indicating a potential to replace MOP. In addition, the solubility of Biofilm-feldspar was further increased with the heat treatment. The highest release of K (ca. 115 ppm) was observed in feldspar heated at 200 °C followed by BF treatment. From the heat treatment, microscale cracks might have formed and facilitated the microbial action on the mineral structure. The study revealed the potential of using Biofilm-feldspar as a bio-mineral fertilizer in agriculture. However, further studies should be conducted to evaluate Biofilm-feldspar in soil-plant systems under farmers' field conditions.

Keywords: Biofilm formulation, Bio-mineral fertilizer, Potassium feldspar