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BIOPOLYMER NANOPARTICLES LOADED WITH CALCIUM AS A SOURCE OF FERTILIZER

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Nanomaterials may improve the vegetal growth and could be used as nanofertilizers in order to increase crops yield. Therefore the present investigation's objective was to synthetize and characterize gelatin nanoparticles loaded with calcium generated through pulverization technique (Nano Spray Dryer B - 90®) and used as nanofertilizers. To obtain these materials a factorial design fractional 2^{7-4} was used in order to evaluate the largest number of factors with a possible effect on the size, distribution and morphology of nanoparticles. Size and morphology of the obtained nanoparticles were evaluated using a SEM equipped with an EDS detector. The total quantification of Ca^{2+} as well as its release by the nanoparticles was carried out in an ICP-MS. Of the all factors evaluated, only the concentration of fertilizer, nozzle opening and concentration of polymer presented a statistically significant effect on particle size (<0.05). Micrographs of SEM from six conditions evaluated in this research showed particles separated and with a good degree of sphericity and also the particles showed smooth surfaces. The average size of smallest particle obtained was 492 nm, while EDS´s results showed an regular distribution of Ca^{2+} in the polymer matrix. The largest concentration of Ca^{2+} in ICP was 10.5%, while the release kinetics showed an upward trend within 24 h. The characteristics of nanoparticles resulted from manipulation of the conditions of synthesis which allow control of the size and shape of the particles, and provides the means to adapt the properties of the materials to an specific application.

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