RECOVERY OF SOLID WASTE WITH A HIGH CONTENT OF SAPONINS FROM THE DRY DESAPONIFICATION PROCESS OF BITTER QUINOA SEEDS, VIA A SPOUTED BED

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ABSTRACT

The optimal operating conditions have been identified for the recovery of saponins, during the dry processing of bitter quinoa seeds, by means of a spouted bed. This innovative process for the removal of saponins was developed by the Research Centers of Universidad Privada Boliviana.

Trials were performed with three Royal Quinoa ecotypes: White, Yellow and Pink, which were processed in a laboratory-scale glass reactor of 7,5 cm in diameter, fed with air from a compressor of 400 $Lmin^{-1}$ capacity, the humidity and oil of which were removed by a filter. The effects of varying the primary system variables, processing time, air nozzle diameter, Quinoa Royal ecotype and bed reactor height, were evaluated in terms of the quality of the collected solid waste (saponin content) and on the quality of the quinoa seeds (final saponin content and mass loss). The saponin content of the samples was quantified by the Soap (Afrosimetric) Method and the Spectrophotometric (Colorimetric) Method.

For the White and Yellow Quinoa Royal ecotypes, the optimal processing time for the recovery of saponins is 5 minutes, in conjunction with an air nozzle diameter of 1,1 mm and a bed reactor height of 7,5 cm. The saponin content is 4,88 % and 6,18 % respectively. For the Pink Quinoa Royal ecotype, the best time for the recovery of saponins is 3 minutes and results in solid waste with a 5,75 % saponin content. At this processing time the quinoa seeds have lost mass between 2,5 – 3 % and the saponin content remains above the accepted level for human consumption of 0.12 %, therefore, the removal of the saponins from the episperm of quinoa seeds should continue until the levels required for consumption are reached. The percentage of saponins in the collected solid waste increases when higher quality raw material, i.e. raw material with fewer impurities, is used. In all the trials, the percentage of saponins in the collected solid waste is greater than that of the harrowing step in enterprises which use the conventional method of desaponification.

The use of a spouted bed in the processing of ecotypes and varieties of bitter quinoa result in a solid waste product with a higher saponin content, thus promoting the final recovery of saponins and resulting in a product of higher commercial value. The main operating variables in the process, processing time, tip diameter, and ecotype have been investigated and optimized.

Keywords: Quinoa, Saponins, Desaponification, Spouted Bed.