

COMPARISON OF THREE METHODS FOR ISOLATING STARCH FROM TURMERIC (*Curcuma longa*) SPENT AND SUBSEQUENT CHARACTERIZATION OF PROPERTIES

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Turmeric spent, the residue remaining after oleoresin extraction from turmeric, contains a significant proportion of starch. This study aimed to identify the best protocol for starch isolation from turmeric spent (TS) and to optimize the parameters to maximize its yield. Initially, starch was isolated using three methods: water steeping [WS (12 h in 27°C and centrifuged at 3000 rpm for 30 minutes)], acid steeping [AS (1% ascorbic acid for 18 h in 27°C and centrifuged at 5000 rpm for 30 minutes)], and alkaline steeping [KS (1% sodium hydroxide for 18 h in 27°C and centrifuged at 5000 rpm for 30 minutes)]. Subsequently, isolated starch was characterized in terms of yield, purity, and functional properties. Results revealed that AS yield at the highest significant ($p<0.05$) starch content [$15.12\pm0.75\%$ (w/w)] compared to WS [$14.33\pm0.47\%$ (w/w)] and KS [$10.07\pm0.34\%$ (w/w)]. The highest significant ($p<0.05$) purity of starch was also reported by AS [$58.00\pm0.36\%$ (w/w)] compared to WS [$56.47\pm1.12\%$ (w/w)] and KS [$55.13\pm0.40\%$ (w/w)]. The functional properties of starch obtained from AS: amylose content ($52.11\pm8.58\%$) and solubility ($9.83\pm1.4\%$) were also significantly higher ($p<0.05$) than WS and KS. Whereas, the gelatinization temperature, swelling power, viscosity, and water-binding capacity of isolated starch from AS were reported as $67.7\pm1.58^\circ\text{C}$, $5.41\pm0.17\text{ g g}^{-1}$, $20.00\pm0.00\text{ cP}$, and $51.13\pm1.40\%$, respectively. To further optimize starch isolation, AS was employed under three acid concentrations (1%, 2%, and 3%) at two temperatures (10°C and 27°C), at three centrifugation speeds (3000 rpm, 4000 rpm, and 5000 rpm). The findings indicated the highest ($p<0.05$) starch yield [$17.52\pm0.37\%$ (w/w)] for the treatment combination of 2% ascorbic acid at 10°C and centrifugation at 5000 rpm. To conclude, the optimized AS method mentioned above is ideal for producing higher starch yield and purity, demonstrating significant potential for use in the food and pharmaceutical industries with further refining.

Keywords: Acid steeping, Alkaline steeping, Starch yield, Water steeping