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Effect of carrier agents on flowability and microstructural properties of foam-mat freeze dried date powder

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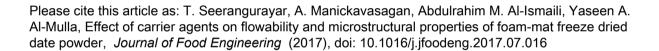
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12	Abstract
13	Date powder was produced without (control) and with carrier agents at three ripening
14	stages of dates (khalal, rutab and tamr) by foam-mat freeze drying method.
15	Maltodextrin (MD) DE 10 and gum arabic (GA) were used as carrier agents at two
16	concentration levels (40% and 50%). The effect of carrier agents on flowability and
17	microstructural properties of the date powder was investigated. The ripening stage,
18	carrier type and their concentration levels had significant effect on almost all the flow
19	parameters. Control powder particles had more clumps resulted in nil flowability.
20	Date powders produced with GA had lower moisture content (7.1-9.7%), angle of
21	repose (32-37°), bulk density (0.6-0.7 g/cm³), tapped density (0.8-0.9 g/cm³), particle
22	density (1.5-1.6 g/cm ³), Carr Index (20-24%) and Hausner ratio (1.3) and also
23	relatively smaller particles (47±20 μm) compared to powders produced with MD.
24	Microstructural analysis of powder particles revealed that carrier agents were
25	imperative to get free-flow powder. Overall, date powders produced with GA had
26	relatively good flowability and lower cohesiveness. Similarly, 50% carrier agent-
27	added powder had relatively better flowability.
28	
29 30	Keywords: Date powder, foam-mat freeze drying, angle of repose, flowability, cohesiveness, microstructure

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