[0004] Accordingly, there exists a need in the art for compositions that can prevent and/or treat allergies, and processes for making such compositions.

SUMMARY

[0005] The disclosure is directed, at least in part, to a process for producing a homogenized liquid mixed allergen composition. For example, this disclosure provides for a process for producing a homogenized liquid mixed allergen composition comprising: dry blending a dry mixture, wherein the dry mixture comprises 6 or more allergens, *e.g.*, 6 to 20 allergens, and a bulking agent; milling the dry mixture and passing the milled dry mixture through a large screen (*e.g.*, with an opening size of about 0.033 inches) to obtain a first pass mixture; milling the first pass mixture and passing the first pass mixture through a small screen (*e.g.*, with an opening size of about 0.020 inches) to obtain a fine particle mixture with substantially consistent particle size; mixing the fine particle mixture into water (*e.g.*, shear mixing) to obtain a hydrated mixture; and passing the hydrated mixture through a homogenizer to obtain a homogenized liquid mixed allergen composition. Milling the dry mixture may include using a rotor speed of about 7,500 RPM, for example, milling the first pass mixture may use a rotor speed of about 7,500 RPM.

[0005a] In one aspect, the present disclosure provides a process for producing a homogenized liquid mixed allergen composition comprising: dry blending a dry mixture, wherein the dry mixture comprises 6 to 20 allergens and a bulking agent; milling the dry mixture and passing the milled dry mixture through a large screen to obtain a first pass mixture; milling the first pass mixture and passing the first pass mixture through a small screen to obtain a fine particle mixture with substantially consistent particle size; mixing the fine particle mixture into water to obtain a hydrated mixture; and passing the hydrated mixture through a homogenizer to obtain a homogenized liquid mixed allergen composition.

[0006] As part of a contemplated process, milling the dry mixture and/or milling the first pass mixture may further comprise pulsing a vacuum suction through the mill.

[0007] Dry blending a dry mixture as part of a contemplated process may include, for example, dry blending a dry mixture comprising 6 or more allergens, *e.g.*, 6 to 20 allergens, and a bulking agent comprising maltodextrin and/or sucrose. In an embodiment, a contemplated bulking agent comprises maltodextrin and sucrose in a weight ratio of about 3:1 maltodextrin to

sucrose. In an alternative embodiment, one or more additional allergens are dry milled separately and optionally mixed with the dry mixture, the first pass mixture, and/or the fine particle mixture.

[0008] A contemplated process may further comprise hydrating the fine particle mixture in the water for about 1 hour or more and/or processing the liquid mixed allergen mixture at an ultra-high temperature (*e.g.*, about 287°F or higher). In some embodiments, processing the liquid mixed allergen mixture at an ultra-high temperature occurs after passing the hydrated mixture through the homogenizer.

[0009] In an exemplary embodiment, a contemplated process further comprises shear mixing the homogenized liquid allergen mixture with one or more excipients to obtain a shear-mixed homogenized liquid allergen mixture. For example, such excipients may each be selected from the group consisting of: a food safe oil, a polysaccharide (*e.g.*, gellan gum), flavoring, and a food safe salt (*e.g.*, dipotassium phosphate).

[0010] A contemplated process, may, in some embodiments, further comprise in-line homogenizing the shear-mixed homogenized liquid allergen mixture. In some embodiments, in-line homogenizing the shear-mixed homogenized liquid allergen mixture occurs after processing at an ultra-high temperature.

[0011] In another aspect, the present disclosure provides a liquid mixed allergen composition comprising a homogenized liquid mixed allergen composition wherein the homogenized liquid mixed allergen composition is produced by a process as disclosed herein.

[0012] In another aspect, the present disclosure provides a liquid homogenized mixed allergen composition comprising: 12 to 16 different protein allergens; maltodextrin; sucrose; oil, and optionally a vitamin (*e.g.*, vitamin D), wherein the weight ratio of maltodextrin to sucrose is about 3:1. Disclosed liquid homogenized mixed allergen compositions may further comprise gellan gum.

[0013] In another aspect, the present disclosure provides a unit dose of about 20 mL to about 30 mL of a liquid homogenized mixed allergen composition comprising: 12 to 16 different protein allergens; maltodextrin; sucrose; oil, and optionally a vitamin, wherein the weight ratio of maltodextrin to sucrose is about 3:1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] **Fig. 1** depicts a comparison of a pre-milled and post-milled dry mixed allergen composition.

DETAILED DESCRIPTION

[0015] Disclosed herein are liquid mixed allergen compositions of two or more different allergens, and processes for making such compositions.

Processes of Making Mixed Allergen Compositions

[0016] Provided herein is a process for producing a homogenized liquid mixed allergen composition, *e.g.*, a liquid mixed allergen composition such as described herein. A disclosed process may, *e.g.*, comprise one or more of the following steps: dry blending a dry mixture,