[0004] Accordingly, there exists a need in the art for allergen compositions that can prevent and/or treat allergies, and methods for making allergen compositions to prevent and/or treat allergies

SUMMARY

[0005] The disclosure is directed, at least in part, to a method for producing a substantially aerobic organism free mixed allergen composition. For example, this disclosure provides a method for producing a substantially aerobic organism free mixed allergen composition comprising: providing a mixed allergen composition comprising 6 or more allergens, *e.g.,* 6 to 20 allergens, and a bulking agent, wherein the mixed allergen composition comprises at least 6% fat content; milling the mixed allergen composition in a conical mill to obtain a milled composition with substantially consistent particle size; and applying microwaves or radio frequency interference to the milled composition so that the milled composition is heated to at least 190°F for at least 30 minutes, thereby to obtain the substantially aerobic organism free mixed allergen composition. In certain examples, the mixed allergen composition comprises at least 12% fat content.

[0005a] In one aspect, the present disclosure refers to a method of making a substantially aerobic organism free mixed allergen composition, comprising:

providing a mixed allergen composition comprising 6 to 20 allergens and a bulking agent, wherein the mixed allergen composition comprises at least 6% fat content;

milling the mixed allergen composition in a conical mill to obtain a milled composition with substantially consistent particle size; and

applying microwaves or radio frequency interference to the milled composition so that the milled composition is heated to at least 190°F for at least 30 minutes,

thereby to obtain the substantially aerobic organism free mixed allergen composition.

[0005b] In another aspect, the present disclosure refers to a substantially aerobic organism free mixed allergen composition prepared by the method disclosed herein.

[0005c] In a further aspect, the present disclosure refers to a food product comprising the substantially aerobic organism free mixed allergen composition disclosed herein.

[0006] As part of a contemplated method, milling the mixed allergen composition may comprise using a rotor speed of about 9000 RPM and/or passing the mixed allergen composition through a screen with an opening size of about 0.033 inches. As part of a contemplated method, milling the mixed allergen composition may comprise applying a vacuum suction through the conical mill.

[0007] A contemplated method may further comprise wetting the milled composition, *e.g.,* to a moisture content of about 6% to about 9%, *e.g.,* about 9%, and/or a water activity of about 0.65 to about 0.8, *e.g.* about 0.75 to about 0.8, prior to applying microwaves or radio frequency interference to the milled mixed allergen composition. A contemplated method may further comprise pressurizing the milled composition, *e.g.,* to at least 30 psi for at least 30 minutes. In certain examples, applying microwaves or radio frequency interference to the milled composition and pressurizing the milled composition are conducted simultaneously.

[0008] As part of a contemplated method, the milled composition may be heated to at least 200°F for at least 60 minutes, *e.g.,* to at least 230°F for at least 60 minutes. As part of a contemplated method, the milled composition may be heated to no more than 250°F and/or for no more than 2, 5, 10, 30, 60, 120 or 1000 minutes. As part of a contemplated method, the milled composition may be heated in a microwave blender, *e.g.,* a microwave blender that includes a 75,000 watt microwave transmitter.

[0009] In certain examples, a contemplated substantially aerobic organism free mixed allergen composition has fewer than about 4.5, about 4, about 3.5, about 3, about 2.5, about 2, or about 1.5 log CFU/g total aerobic organisms, and/or the substantially aerobic organism free mixed allergen composition has fewer than about 1 log CFU/g total coliforms.

[0010] In certain examples, the substantially aerobic organism free mixed allergen composition has at least about 0.5, about 1, about 1.5, about 2, about 2.5, about 3, about 3.5, or about 4 log CFU/g fewer aerobic organisms than the mixed allergen composition. In certain examples, the substantially aerobic organism free mixed allergen composition has a substantially similar protein structure as the mixed allergen composition, as measured by SDS-PAGE and/or a substantially similar allergen effect as the mixed allergen composition, as measured by immune response in a patient.

[0011] It is contemplated that the bulking agent may comprise a sugar. It is contemplated that the mixed allergen composition may, *e.g.*, comprise equal parts by protein mass of: at least one nut flour, wherein each nut flour is selected from the group consisting of peanut flour, almond flour, walnut flour, cashew flour, hazelnut flour, pecan flour and pistachio flour; at least one fish powder, wherein each fish powder is selected from the group consisting of cod powder and salmon powder; wheat; and powdered hen's egg or egg white. In certain examples, the mixed allergen composition may further comprise at least one additional allergen component, *e.g.*, soy and/or an additional allergen component selected from oat flour, sesame seed flour, and shrimp flour. In certain examples, the mixed allergen composition may further comprise vitamin D. In an exemplary example, the mixed allergen composition comprises 30 mg by protein weight shrimp powder; 30 mg by protein weight almond powder; 30 mg by protein weight wheat; 30 mg by protein weight cod powder; 30 mg by protein weight powdered hen's egg; and 400 IU vitamin D.

[0012] Also contemplated herein is a substantially aerobic organism free mixed allergen composition produced by a disclosed method, and a food product comprising a substantially aerobic organism free mixed allergen composition produced by a disclosed method.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIGURE 1 is an SDS-PAGE gel showing a mixed allergen composition (Product A) following treatment in a WaveMix microwave blender.

[0014] FIGURE 2 is a line graph depicting the relationship between moisture and water activity (a_w) for the indicated compositions formulated with the indicated bulking agents.