one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein;

a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP);

wherein the egg substitute is produced by a method comprising:

(a) extracting one or more mung bean proteins from a plant source of mung bean protein in an aqueous solution at a pH between 6.5 and 10.0; and

(b) precipitating the extracted mung bean protein at a pH in a range of pH 5.6 to pH 6.0.

[0017b] According to another aspect, there is provided an edible composition comprising the egg substitute described herein, wherein the composition is selected from the group consisting of a gel, a foam, an emulsion, and an aqueous solution.

[0017c] According to another aspect, there is provided a fat reduction shortening system comprising the egg substitute described herein.

[0017d] According to another aspect, there is provided a food or beverage composition comprising the egg substitute described herein.

[0017e] According to another aspect, there is provided a method for producing an egg substitute comprising:

(a) extracting one or more mung bean proteins from a plant source of mung bean protein in an aqueous solution at a pH between 6.5-10.0;

(b) precipitating the mung bean protein at a pH at the isoelectric point of a globulin-rich fraction, or at a pH in a range of 5.6 to 6.0; or fractionating and concentrating the mung bean protein using microfiltration or ultrafiltration; and

(c) formulating the mung bean protein into an egg substitute, wherein the egg substitute comprises:

a mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein;

a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP); and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein.

[0017f] According to another aspect, there is provided an egg substitute produced by the method for producing a purified mung bean protein isolate described herein.

[0017g] According to another aspect, there is provided an egg substitute produced by the method for producing a purified mung bean protein isolate described herein comprising:

a transglutaminase-modified mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to the otherwise unmodified plant source of the mung bean protein; and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein.

[0017h] According to another aspect, there is provided a method for producing an egg substitute comprising:

(a) extracting one or more mung bean protein from a plant source in an aqueous solution at a pH between 6.5-10.0;

(b) precipitating the mung bean protein at pH near its isoelectric point of a globulin-rich fraction or at a pH in a range of 5.6 to 6.0; or fractionating and concentrating the plant protein using microfiltration or ultrafiltration;

(c) formulating the mung bean protein into an egg substitute, wherein the egg substitute comprises:

a mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein; and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein;

a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP); and

(d) modifying the mung bean protein with transglutaminase in the extraction step (a) or the precipitating step (b).

WHAT IS CLAIMED:

1. An egg substitute comprising

a mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein; and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein;

a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP);

wherein the egg substitute is produced by a method comprising:

(a) extracting one or more mung bean proteins from a plant source of mung bean protein in an aqueous solution at a pH between 6.5 and 10.0; and

(b) precipitating the extracted mung bean protein at a pH in a range of pH 5.6 to pH 6.0.

2. The egg substitute of claim 1, wherein the precipitating of step (b) is performed at pH 5.6, 5.7, 5.8, 5.9 or 6.0.

3. The egg substitute of claim 1 or 2, wherein the modulated organoleptic properties comprise a reduction or absence in one or more of the following: astringent, beany, bitter, burnt, buttery, nutty, sweet, sour, fruity, floral, woody, earthy, beany, spicy, metallic, sweet, musty, grassy, green, oily, vinegary neutral and bland flavor or aromas.

4. The egg substitute of any one of claims 1 to 3, wherein the reduced oxidative enzymatic activity comprises a reduction of oxidization of lipids or residual lipids relative to the otherwise unmodified plant source of the mung bean protein.

5. The egg substitute of any one of claims 1 to 4, wherein the reduced oxidative enzymatic activity comprises a reduction in the amount of lipids or residual lipids in the egg substitute relative to the amount of lipids in the otherwise unmodified plant source of the mung bean protein.

6. The egg substitute of any one of claims 1 to 5, wherein the reduced oxidative enzymatic activity comprises a reduction in the amount of lipoxygenase (EC 1.13.11.-) relative to the otherwise unmodified plant source of the mung bean protein.

7. The egg substitute of any one of claims 1 to 6, wherein the egg substitute exhibits one or more functional properties selected from emulsification, water binding, foaming, gelation, crumb density, structure forming, texture building, cohesion/adhesion, elasticity/springiness, solubility, viscosity, fat absorption, flavor binding, coagulation, leavening, aeration, creaminess, film forming property, sheen/shine addition, freeze/thaw stability, and color.

8. The egg substitute of any one of claims 1 to 7, wherein the egg substitute exhibits a gelation onset temperature below 90°C.

9. The egg substitute of any one of claims 1 to 8, wherein the egg substitute exhibits a gel strength of greater than 2% oscillation strain.

10. The egg substitute of any one of claims 1 to 9, wherein the egg substitute exhibits a gel elasticity of greater than 300 Pa.

11. The egg substitute of any one of claims 1 to 10, wherein the egg substitute comprises greater than 75% mung bean protein.

12. The egg substitute of any one of claims 1 to 11, wherein the mung bean protein comprises at least 60% globulin protein.

13. The egg substitute of any one of claims 1 to 12, wherein the globulin protein comprises 8S globulin/beta conglycinin.

14. The egg substitute of any one of claims 1 to 13, wherein the globulin protein is a protein having at least 50% identity to SEQ ID NO. 1.

15. The egg substitute of any one of claims 1 to 14, wherein the globulin protein has been enriched in the egg substitute in relation to the amount of protein found in the plant source of the mung bean protein.

16. The egg substitute of claim 15, wherein the enrichment is at least 5%, 10%, 15%, 20% or greater than 20%, in relation to the amount of protein found in the plant source of the mung bean protein.

17. The egg substitute of any one of claims 1 to 16, wherein one or more compounds selected from the group consisting of allergens, anti-nutritional factors, and environmental contaminants has been reduced in the egg substitute in relation to the amount of the one or more compounds found in the plant source of the mung bean protein.

18. The egg substitute of any one of claims 1 to 17, contacted with one or more co-ingredients selected from the group consisting of a hydrocolloid, a gum, a phosphate, and transglutaminase.

19. The egg substitute of claim 18, wherein one co-ingredient is disodium phosphate.

20. An edible composition comprising the egg substitute of any one of claims 1 to 19, wherein the composition is selected from the group consisting of a gel, a foam, an emulsion, and an aqueous solution.

21. The egg substitute of any one of claims 1 to 19, wherein the egg substitute comprises one or more organoleptic properties similar to an egg.

22. The egg substitute of claim 21, wherein the egg substitute exhibits at least one functional property similar or equivalent to a corresponding functional property of an egg.

23. The egg substitute recited in claim 22, wherein the at least one functional property comprises emulsification, water binding capacity, foaming, gelation, crumb density, structure forming, texture building, cohesion, adhesion, elasticity, springiness, solubility, viscosity, fat absorption, flavor binding, coagulation, leavening, aeration, creaminess, film forming property, sheen addition, shine addition, freeze stability, thaw stability, or color.

24. A fat reduction shortening system comprising the egg substitute of any one of claims 1 to 19.

25. A food or beverage composition comprising the egg substitute of any one of claims 1 to 19.

26. The food or beverage composition of claim 25, wherein the food or beverage composition is selected from the group consisting of an edible egg-free emulsion, egg analog, egg-free scrambled eggs, egg-free patty, egg-free pound cake, egg-free angel food cake, egg-free yellow cake, egg- and dairy-free cream cheese, egg-free pasta dough, egg-free custard, egg-free ice cream, and dairy-free milk, cream cheese, pasta dough, pasta, milk or milk-like beverage, a food product comprising said milk or milk-like beverage, butter, custard, ice cream, frozen desert, meat replicas, deli meat replicas, emulsified extruded meats, sausages, fish cake replicas, dips, fillings, spreads, chips, crackers, cereal bars, granola bars, meal replacement or nutritional bars, energy bars, fermented beverages made from rice, barley, grains, legumes or tea, non-milk based instant protein powders, non-milk based nutritional beverages (RTD and powdered types), non-milk based protein-enriched fruit smoothies, non-milk based weight control beverages, instant shakes, protein drinks (RTD and powdered types), breakfast cereals (RTE), seasoning sauces, non-dairy cheese , non-dairy spreads, non-dairy dips, non-dairy cream or sour cream (liquid and powder), non-dairy ice cream and frozen desserts, non-dairy coffee whiteners, non-dairy yogurt and non-dairy drinkable yogurts, whipped topping, ice pops, sorbets, puddings, mousse, milk-based instant protein powders, milk-based nutritional beverages (RTD and powdered types), milk-based weight control beverages, milk-based smoothies, egg product analogs, vegetarian food products and meat analogues, snack chips, popcorn, and extruded snacks.

27. A method for producing an egg substitute comprising:

(a) extracting one or more mung bean proteins from a plant source of mung bean protein in an aqueous solution at a pH between 6.5-10.0;

(b) precipitating the mung bean protein at a pH at the isoelectric point of a globulin-rich fraction, or at a pH in a range of 5.6 to 6.0; or fractionating and concentrating the mung bean protein using microfiltration or ultrafiltration; and

(c) formulating the mung bean protein into an egg substitute, wherein the egg substitute comprises:

a mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein;

a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP); and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein.

28. The method of claim 27, wherein the extraction step is performed within a pH range of 6.5-8.0.

29. The method of claim 27 or 28, wherein the precipitating step is performed at pH 5.6, 5.7, 5.8, 5.9 or 6.0.

30. The method of any one of claims 27 to 29, further comprising the step of treating the mung bean protein with activated carbon, charcoal or clay.

31. The method of any one of claims 27 to 30, further comprising the step of cryo-precipitating at a temperature of 1 to 4°C.

32. The method of any one of claims 27 to 31, further comprising centrifugation of the mung bean protein.

33. The method of any one of claims 27 to 32, further comprising rehydrating the mung bean protein to 80% moisture content and adjusting to pH 6.0.

34. The method of any one of claims 27 to 33, wherein the method further comprises one or more additional steps selected from the group consisting of: diluting aqueous protein in calcium salt solution; filtering protein via heat treatment; diafiltering via selective membranes; diluting protein in buffer to adjust pH per target application; concentrating protein depending upon application; and drying protein depending upon application.

35. The method of any one of claims 27 to 34, wherein the method comprises reducing lipophilic off-flavors, substrates or co-factors.

36. The method of any one of claims 27 to 34, wherein the method modulates off-flavors or aromas; modulates desired flavors; or provides sensory impressions similar or equivalent to a reference food product.

37. The method of any one of claims 27 to 36, further comprising the step of formulating the egg substitute in a food or beverage composition.

38. An egg substitute produced by the method of claim 37.

39. An egg substitute produced by the method of any one of claims 27 to 37 comprising:

a transglutaminase-modified mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to the otherwise unmodified plant source of the mung bean protein; and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein.

40. The egg substitute of claim 27, wherein said mung bean protein is modified by 0.0001 % to 0.0125% transglutaminase in steps (a) or (b).

41. A method for producing an egg substitute comprising:

(a) extracting one or more mung bean protein from a plant source in an aqueous solution at a pH between 6.5-10.0;

(b) precipitating the mung bean protein at pH near its isoelectric point of a globulin-rich fraction or at a pH in a range of 5.6 to 6.0; or fractionating and concentrating the plant protein using microfiltration or ultrafiltration;

(c) formulating the mung bean protein into an egg substitute, wherein the egg substitute comprises:

a mung bean protein content of at least 60% by weight;

a globulin protein content of at least 50% by weight of the mung bean protein;

a reduced oxidative enzyme activity relative to an otherwise unmodified plant source of the mung bean protein; and

one or more modulated organoleptic properties that differ from the otherwise unmodified plant source of the mung bean protein;

a phosphate selected from the group consisting of disodium phosphate (DSP), sodium hexametaphosphate (SHMP), and tetrasodium pyrophosphate (TSPP); and

(d) modifying the mung bean protein with transglutaminase in the extraction step (a) or the precipitating step (b).

42. The method for producing an egg substitute of claim 41, wherein said step (d) of modifying the mung bean protein with transglutaminase in the extraction step (a) or the precipitating step (b) comprises contacting the mung bean protein with 0.0001 % to 0.0125% transglutaminase.

43. The method for producing an egg substitute of claim 41 or 42, wherein said mung bean protein is stably cross-linked.

44. The method for producing an egg substitute of any one of claims 41 to 43, wherein said mung bean protein is essentially free of lipoxygenase or enzymes that can oxidize lipids.

45. The method for producing an egg substitute of any one of claims 41 to 44, wherein said transglutaminase is encapsulated or immobilized on a solid substrate.