

CLAIMS

What is claimed is:

1. A pongamia oil composition, having:
 - less than or equal to about 1000 ppm of karanjin and pongamol combined;
 - less than or equal to about 1% by weight of unsaponifiable matter;
 - a peroxide value of less than or equal to about 5 meq/kg;
 - a p-anisidine value of less than or equal to about 10; and
 - less than or equal to about 25 ppm of residual solvents.
2. The composition of claim 1, having:
 - less than or equal to about 150 ppm of karanjin;
 - less than or equal to about 150 ppm of pongamol;
 - less than or equal to about 1% by weight of unsaponifiable matter;
 - a peroxide value of less than or equal to about 5 meq/kg;
 - a p-anisidine value of less than or equal to about 5; and
 - less than or equal to about 25 ppm of residual solvents.
3. The composition of claim 1 or 2, wherein the residual solvents comprise a non-polar solvent.
4. The composition of any one of claims 1 to 3, wherein the residual solvents comprise a non-polar solvent and wherein the non-polar solvent comprises alkane.
5. The composition of any one of claims 1 to 4, wherein the composition is liquid at room temperature.
6. The composition of any one of claims 1 to 5, wherein the composition has a viscosity of between about 30 centipoise and 600 centipoise as determined at 25°C.
7. The composition of any one of claims 1 to 6, wherein the composition has a solid fat content of between about 1% and about 10% at a temperature of about 5°C.
8. The composition of any one of claims 1 to 7, wherein the composition has a smoke point of at least about 195 °C.

9. The composition of any one of claims 1 to 8, wherein the composition has at least 400 ppm of tocopherols.
10. The composition of any one of claims 1 to 9, wherein the composition has less than 2500 ppm of sterols.
11. The composition of any one of claims 1 to 10 wherein the composition comprises oleic acid, linoleic acid, palmitic acid, stearic acid, behenic acid, alpha linolenic acid, lignoceric acid, arachidic acid, gondoic acid, oleic acid, vaccenic acid, palmitoleic acid, eicosadienoic acid, linoleic acid, margaric acid, gondoic acid, erucic acid, palmitoleic acid, heptadecenoic acid, or myristic acid, or any isomers thereof, or any combination of the foregoing.
12. The composition of claim 11, wherein the composition comprises at least 40% oleic acid.
13. The composition of any one of claims 1 to 12, wherein the color of the composition is yellow or light yellow as determined by the Lovibond Color - AOCS Scale using a 1-inch cell path, wherein:

when the composition is yellow, the composition has a Lovibond Color Y-value of greater than or equal to 25; and

when the composition is light yellow, the composition has a Lovibond Color Y-value of less than 25.
14. The composition of any one of claims 1 to 13, wherein the composition has one or more sensory attributes selected from the group consisting of: nuttiness, butteriness, grassiness, smoothness, and sweetness, and any combinations thereof.
15. The composition of any one of claims 1 to 14, wherein the composition has a ratio of karanjin to pongamol of greater than about 1.
16. The composition of any one of claims 1 to 13, wherein the color of the composition is light yellow and the composition has a Lovibond Color Y-value of less than 25 as determined by the Lovibond Color - AOCS Scale using a 1-inch cell path.
17. The composition of any one of claims 1 to 13 and 16, wherein the color of the composition is light yellow as determined by the Lovibond Color - AOCS Scale, and wherein the composition comprises less than or equal to about 200 ppm karanjin and pongamol combined.

18. The composition of any one of claims 1 to 13, 16 and 17, wherein the composition has a neutral flavor.
19. The composition of any one of claims 1 to 13 and 16 to 18, wherein the composition has a ratio of karanjin to pongamol of less than or equal to 1.
20. The composition of any one of claims 1 to 19, wherein the composition has:
 - (i) a free fatty acid content of less than or equal to about 1%;
 - (ii) less than or equal to about 0.1% of insoluble impurities;
 - (iii) less than or equal to about 25 ppm of phosphorus;
 - (iv) less than or equal to about 0.1 ppm of chlorophyll;
 - (v) a moisture content of less than or equal to about 1%;
 - (vi) less than or equal to about 1% glycerol;
 - (vii) less than or equal to about 2% monoglycerides;
 - (viii) less than or equal to about 5% diglycerides; and
 - (ix) at least about 90% triglycerides,
 - (x) or any combination of (i)-(ix).
21. The composition of any one of claims 1 to 20, wherein the karanjin and pongamol concentration is determined by HPLC-DAD analysis of an acetone extract obtained from the pongamia oil composition.
22. An analytical method, comprising:
 - combining pongamia oil with an extraction solvent to provide an extraction mixture, wherein the extraction solvent comprises alkyl ketone, and wherein the pongamia oil comprises karanjin or pongamol, or both;
 - sonicating the extraction mixture to produce a sonicated mixture;
 - separating the sonicated mixture into an extracted pongamia composition and an alkyl ketone extract, wherein the extract comprises karanjin or pongamol, or both; and
 - measuring the concentration of karanjin or pongamol, or both, present in the extract.
23. The method of claim 22, wherein the alkyl ketone is acetone.

24. The method of claim 22 or 23, wherein the measuring step comprises determining the concentration of karanjin or pongamol, or both, by high performance liquid chromatography with an ultraviolet detector.
25. The method of claim 24, wherein the ultraviolet detector is a diode array detector.
26. A method for producing a pongamia oil composition, comprising:
combining crude pongamia oil with non-polar solvent to produce a crude mixture, wherein the non-polar solvent comprises alkane, and wherein the crude pongamia oil comprises pongamia oil and furanoflavonoids;
eluting the crude mixture through silica gel with the non-polar solvent to separate at least a portion of the furanoflavonoids from the pongamia oil, and to produce a purified mixture comprising pongamia oil and the non-polar solvent; and
removing at least a portion of the non-polar solvent from the purified mixture to produce a pongamia oil composition, wherein the composition has less than or equal to about 1000 ppm of karanjin and pongamol combined as determined by HPLC-DAD analysis of an acetone extract obtained from the pongamia oil composition; less than or equal to about 1% by weight of unsaponifiable matter; a peroxide value of less than or equal to about 5 meq/kg; and a p-anisidine value of less than or equal to about 10.
27. The method of claim 26, wherein the crude pongamia oil has an initial color, and the pongamia oil composition produced has a final color, wherein the final color of the pongamia oil composition is lighter than the initial color of the crude pongamia oil as determined by the Lovibond Color - AOCS Scale.
28. The method of claim 27, wherein the initial color is red and/or brown, and the final color is yellow or light yellow as determined by the Lovibond Color - AOCS Scale.
29. The method of any one of claims 26 to 28, wherein the crude pongamia oil is mechanically separated pongamia oil.
30. The method of any one of claims 26 to 29, further comprising:
dehulling pongamia oilseeds to produce dehulled oilseeds; and
mechanically separating the dehulled oilseeds to produce the crude pongamia oil and a seedcake that is at least partially deoiled.
31. The method of any one of claims 26 to 30, further comprising:

heating pongamia oilseeds at a temperature between 25°C and 200°C for a suitable time to provide treated oilseeds;

dehulling the treated oilseeds to produce dehulled oilseeds; and

mechanically separating the dehulled oilseeds to produce the crude pongamia oil and a seedcake that is at least partially deoiled.

32. The method of any one of claims 26 to 31, wherein the non-polar solvent comprises hexane.
33. The method of any one of claims 26 to 32, wherein the concentration of karanjin or pongamol, or both, is determined by the method of any one of claims 21 to 24.
34. The method of any one of claims 26 to 33, wherein the crude pongamia oil is combined with the non-polar solvent in a ratio between 1:1 and 3:1 (w/v).
35. The method of any one of claims 26 to 34, wherein the karanjin and pongamol are adsorbed on the silica gel, and the method further comprises:

eluting the silica gel with a polar solvent to isolate the karanjin and pongamol, wherein the polar solvent comprises alkyl alkanoate.
36. The method of any one of claims 26 to 35, wherein the karanjin and pongamol are adsorbed on the silica gel, and the method further comprises:

eluting the silica gel using a stepwise gradient with increasing proportions of polar solvent in the non-polar solvent to isolate karanjin and pongamol separately, wherein the polar solvent comprises alkyl alkanoate.
37. The method of claim 35 or 36, wherein the polar solvent comprises ethyl acetate.
38. A pongamia oil composition produced according to the method of any one of the claims 26 to 37.
39. Use of the pongamia oil composition of any one of claims 1 to 21 and 38 as salad oil, frying oil, sauteeing oil, vinaigrettes, sauces, dressings, fats in meat mimetics, beverages, or blended margarines and other solid fat applications, or any combination thereof.
40. A food or beverage product, comprising the pongamia oil composition of any one of claims 1 to 21 and 38.

41. The product of claim 40, wherein the composition is light yellow as determined by the Lovibond Color - AOCS Scale; the composition comprises less than or equal to about 200 ppm karanjin and pongamol combined as determined by HPLC-DAD analysis of an acetone extract obtained from the pongamia oil composition, and the composition has a neutral flavor.
42. The product of claim 40, wherein the pongamia oil composition is yellow as determined by the Lovibond Color - AOCS Scale; the composition comprises less than or equal to about 150 ppm karanjin and less than or equal to about 150 ppm pongamol as determined by HPLC-DAD analysis of an acetone extract obtained from the pongamia oil composition; and the composition has one or more sensory attributes selected from the group consisting of: nuttiness, butteriness, grassiness, smoothness, and sweetness, and any combinations thereof.
43. The product of any one of claims 40 to 42, wherein the product is salad oil, frying oil, sauteeing oil, vinaigrettes, sauces, dressings, fats in meat mimetics, beverages, or blended margarines and other solid fat applications.