~~CLAIMS~~

Claims

1. A flour composition derived from fungal fermentation of plant material with an active, edible, higher fungus, said fungus being white rot fungi selected from the genuses Pleurotus, Lentinula, Ganoderma, Volvariella, Auricularia, Armillaria, Flammulina, Pholiota, Tremella and/or Hericium, the flour composition having a total metabolizable carbohydrate level of between 0.1 – ~~50% by weight~~10% by weight and comprising between 30 – 90% by weight dietary fibre, wherein the dietary fibre includes 10-70% by weight beta glucans.

2. The flour composition of claim 1, wherein the flour composition ~~comprises 0.1 – 30% by weight metabolizable carbohydrate~~has less than 300 calories/100g flour.

3. The flour composition of claim 1 or 2, wherein the ~~flour composition comprises 0.1 – 10~~dietary fibre includes 40% - 65% by weight ~~metabolizable carbohydrate~~fungal derived 1,3 and 1,6 beta glucans.

~~4. The flour composition of any one of claims 1 - 3, wherein the flour comprises between 30 – 90% by weight dietary fibre.~~

~~5. The flour composition of claim 4, wherein the dietary fibre includes 10-70% beta glucans.~~

~~6. The flour composition of claim 5, wherein the beta glucans includes 40% - 65% fungal derived 1,3 and 1,6 beta glucans.~~

~~7. The flour composition of any one of claims 1 - 6, wherein the flour composition has 150 – 300 calories/100g flour.~~

~~8. The flour composition of any one of claims 1 - 6, wherein the flour composition has less than 200 calories per 100g flour.~~

~~9. The flour composition of claim 1 , wherein the composition includes 0.1-15% metabolizable carbohydrate, 15 – 35% protein, 1 – 10% fat and 50 - 80% dietary fibre.~~

~~10. The flour composition of claim 9, wherein the dietary fibre includes 40% - 65% fungal derived 1, 3 and 1, 6 beta glucans.~~

~~11. The flour composition of any one of claims 1 - 10, wherein the flour~~ composition has a linoleic acid content of 10% of the total fat <u>content of the flour composition,</u> or greater.

~~12. The flour composition of claim 11, wherein the flour composition has a linoleic acid content of 20-70% of the total fat.~~

~~13. The flour composition of any one of claims 1 - 12, wherein the plant material is selected from one or more fruits, nuts, cereals or vegetables including but not limited to kiwifruit, apple, pear, orange, carrot, grape, mango, tomato, avocado, berries, bean, pea, lime, lemon, feijoa, cassava, onion, parsnip, beetroot, banana, peach, nectarine, paw, pineapple, melon, mesquite, watermelon, acorn, hazelnut, chestnut, chickpea, chia, grape, potato, coconut, almond, soybean, sorghum, arrowroot, amaranth, taro, oats, cattails, quinoa, wheat, barley, buckwheat, corn, rice, atta, spelt, rye, hemp, teff or by products and/or derivatives thereof such as fruit and vegetable pomaces, skins/peels, seeds or roots.~~

~~14. The flour composition of any one of claims 1 - 12, wherein the flour composition is gluten-free and the plant material is selected from one or more gluten free plant materials including, but not limited to kiwifruit, apple, pear, orange, carrot, grape, mango, tomato, avocado, berries, bean, pea, lime, lemon, feijoa, cassava, onion, parsnip, beetroot, banana, peach, nectarine, paw, pineapple, melon, mesquite, watermelon, acorn, hazelnut, chestnut, grape, chickpea, chia, potato, coconut, almond, soybean, sorghum, arrowroot, amaranth, taro, cattails, quinoa, buckwheat, corn, rice, atta, hemp, teff or by-products and/or derivatives thereof such as fruit and vegetable pomaces, skins/peels, seeds or roots.~~

~~15. The flour composition of any one of claims 1 – 12, wherein the plant material is derived from low starch fruit or vegetables including one or more of kiwifruit, apple, pear, orange, carrot, grape, mango, tomato, avocado, berries, bean, pea, lime, lemon, feijoa, onion, beetroot, banana, peach, nectarine, paw, pineapple, melon, watermelon, coconut, soybean or by-products and/or derivatives thereof such as pomaces, skins/peels, seeds or roots.~~

~~16. The flour composition of claim 15, wherein the plant material contains less than 10% starch~~5~~.~~

~~17. The flour composition of claim 16, wherein the plant material contains less than 2% starch.~~

~~18. The flour composition of any one of claims 1 - 17, wherein the composition includes5-50% w/w of fungal biomass.~~

~~19. A food composition derived from fungal fermentation of a low starch plant material having less than 20% w/w starch, the food composition having a total metabolizable carbohydrate level less than the total metabolizable carbohydrate level of the plant material prior to fermentation.~~

~~20. The food composition of claim 19, wherein the total metabolizable carbohydrate level of the food composition is at least 20% - 90% less than the total metabolizable carbohydrate level of the plant material prior to fermentation.~~

~~21. The food composition of claim 20, wherein the total metabolizable carbohydrate level of the food composition is at least 40% - 85% less than the total metabolizable carbohydrate level of the plant material prior to fermentation.~~

~~22. The flour composition of claim 19, wherein the plant material contains less than 10% starch.~~

~~23. The flour composition of claim 22, wherein the plant material contains less than 2% starch.~~

~~24. The food composition of any one of claims 19 – 21, wherein the food composition comprises between 30 – 90% by weight dietary fibre.~~

~~25. The food composition of claim 24, wherein the dietary fibre includes beta glucans.~~

~~26. The food composition of claim 25, wherein the dietary fibre includes 40% - 65% fungal derived 1,3 and 1,6 beta glucans.~~

~~27. The food composition of any one of claims 19 - 26, wherein the food composition is a paste, powder, liquid, solid, or in free-flowing form such as flakes, granules, grains or pellets.~~

~~28~~. A process for the production of a flour composition derived from fungal fermentation of plant material, the flour composition having a total available carbohydrate level of between 1 – 50% by weight, the process including the steps of~~;~~:

a) hydrating, drying or maintaining a lignocellulosic plant material substrate to achieve a substrate moisture level between 45% – 95%;
b) sterilising the substrate of a);
c) inoculating the sterile substrate with an active, edible, higher fungus, said fungus being white rot fungi selected from the genuses *Pleurotus*, *Lentinula, Ganoderma, Volvariella*, *Auricularia*, *Armillaria*, *Flammulina*, *Pholiota*, *Tremella* and/or *Hericium*;
d) incubating the inoculated substrate at 18°C – 40°C for a period of ~~time~~5 – 28 days to produce a fermented substrate;
e) drying the fermented substrate of d); and
f) milling the dried, fermented substrate to form a flour composition~~.~~;

~~29. The process of claim 28,~~g) wherein the process ~~is for~~includes the ~~production~~further step of ~~producing~~adding a ~~flour composition having~~functional additive being a ~~total metabolizable carbohydrate level of 0.1-15% by weight.~~

~~30. The process of claim 29, wherein~~food grade nitrogen to the ~~process is for the production of a flour composition having a total metabolizable carbohydrate level of 5-10% by weight~~substrate prior to inoculation.

~~31~~6. The process of claim ~~28~~5, wherein the active, edible, higher fungus used for inoculation in step c) is added at an amount of 5-50% w/w of the hydrated lignocellulosic plant material.

~~32~~7. The process of ~~claim 31, wherein the fungus is added at an amount of 10-20% w/w.~~

~~33. The process of claim 28, wherein the process includes the further step of adding a functional additive to the substrate prior to inoculation.~~

~~34. The process of claim 33, wherein the functional additive is a food grade nitrogen source.~~

~~35. The process of claim 34, wherein the food grade nitrogen source is selected from ammonium sulphate, glutamic acid, yeast extract, peptone and/or di-ammonium phosphate (DAP).~~

~~36. The process of~~ any one of claims ~~28 - 35~~5-6 or the flour composition of any one of claims 1-4, wherein the flour composition is gluten-free and the plant material is lignocellulosic plant material selected from one or more gluten free plant materials selected from ~~one or more fruits, nuts, cereals or vegetables including but not limited to~~the group consisting of kiwifruit, apple, pear, orange, carrot, grape, mango, tomato, avocado, berries, bean, pea, lime, lemon, feijoa, cassava, onion, parsnip, beetroot, banana, peach, nectarine, paw, pineapple, melon, mesquite, watermelon, acorn, hazelnut, chestnut, grape, chickpea, chia, ~~grape,~~ potato, coconut, almond, ~~soybean,~~soybean, sorghum, ~~arrowroot,~~arrowroot, amaranth, ~~taro, oats, cattails, quinoa, wheat, barley,~~taro, cattails, quinoa, buckwheat, corn, rice, atta, ~~spelt, rye,~~ hemp, teff ~~or,~~ by-products

thereof and~~/or~~ derivatives thereof~~ such as fruit and vegetable pomaces, skins/peels, seeds or roots~~.

~~37.~~ 8. The process of any one of claims ~~28 - 35, wherein~~5-6 or the flour composition ~~produced by the process is gluten-free and the~~ of any one of claims 1-4, wherein the plant material is ~~lignocellulosic plant material~~derived from low starch fruit or vegetables selected from ~~one or more gluten free plant materials including, but not limited to~~the group consisting of kiwifruit, apple, pear, orange, carrot, grape, mango, tomato, avocado, berries, bean, pea, lime, lemon, feijoa, ~~cassava,~~ onion, ~~parsnip,~~ beetroot, banana, peach, nectarine, paw, pineapple, melon, ~~mesquite,~~ watermelon, ~~acorn, hazelnut, chestnut, grape, chickpea, chia, potato,~~ coconut, ~~almond, soybean, sorghum, arrowroot, amaranth, taro, cattails, quinoa, buckwheat, corn, rice, atta, hemp, teff or~~soybean, by-products ~~and/or derivatives thereof such as fruit and vegetable pomaces, skins/peels, seeds or roots.~~

~~38. The flour composition of any one of claims 28-35, wherein the plant material is derived from low starch fruit or vegetables including one or more of kiwifruit, apple, pear, orange, carrot, grape, mango, tomato, avocado, berries, bean, pea, lime, lemon, feijoa, onion, beetroot, banana, peach, nectarine, paw, pineapple, melon, watermelon, coconut, soybean or by-products and/or derivatives~~ thereof ~~such as pomaces, skins/peels, seeds or roots~~and derivatives thereof.

~~39. The flour composition of claim 38, wherein the plant material contains less than 10% starch.~~

~~40. The flour composition of claim 39, wherein the plant material contains less than 2% starch.~~

~~41~~9. The process of any ~~one~~ of claims ~~28 - 40, wherein the lignocellulosic plant material substrate is in a moist or wet pomace, slurry, pulp or paste form.~~

~~42. The process of any one of claims 28 – 40 wherein the lignocellulosic plant material substrate is in a dry or semi-dry form, such as a mulch, powder, or coarsely chopped plant material.~~

~~43. The process of claim 28~~5-8, wherein the step of hydrating, drying or maintaining the lignocellulosic plant material substrate achieves a substrate with a moisture content of between ~~75~~55% - 90%.

~~44~~10. The process of ~~claim 28, wherein the sterilisation step includes one or more of high temperature sterilisation, high pressure sterilisation, low temperature sterilisation, irradiation or chemical sterilisation.~~

~~45. The process of claim 28, wherein the edible higher fungi utilised in the inoculation step are white rot fungi.~~

~~46. The process of claim 45~~any one of claims 5-9, wherein the white rot fungi is selected from the ~~genuses~~genus Pleurotus~~, *Lentinula, Ganoderma, Volvariella*, *Auricularia*, *Armillaria*, *Flammulina*, *Pholiota*, *Tremella*~~ and/or ~~*Hericium*~~.

~~47. The process of claim 28, wherein the incubation step includes incubating the inoculated substrate at 18°C – 30°C for a period of 5 – 50 days.~~

~~48. The process of claim 47, wherein the process includes incubating the inoculated substrate at 25°C for 30 days.~~

~~49~~11. The process of any one of claims ~~28 – 48, wherein the flour composition produced by the process comprises between 30 – 90% by weight dietary fibre.~~

~~50. The food composition of claim 49, wherein the dietary fibre includes beta glucans.~~

~~51. The food composition of claim 50, wherein the beta glucans includes 40% - 65%fungal derived 1,3 and 1,6 beta glucans.~~

~~52. The process of any one of claims 28 - 51, wherein the flour composition produced by the process has 150 – 300 calories/100g flour.~~

~~53. The process of any one of claims 28 – 51, wherein the flour composition produced by the process has less than 200 calories per 100g flour.~~

~~54. The process of any one of claims 28 – 53, wherein the flour composition produced by the process has a linoleic acid content of 2% of total fat or greater.~~

~~55. The process of claim 54, wherein the flour composition produced by the process has a linoleic acid content of 30-70% of total fat.~~

~~56. The process of claim 28~~5-10, wherein the step of drying the fermented substrate includes drying the substrate at a temperature of 30° – ~~40~~70°C.

~~57~~12. The process of ~~claim 28~~any one of claims 5-11, wherein the step of drying occurs under vacuum conditions.

~~58. A process for the production of a composition derived from fungal fermentation of plant material, the composition produced by the process having a total available carbohydrate level of less than the total available carbohydrate level of the starting plant material, the process including the steps of;~~

~~a) hydrating, drying or maintaining a lignocellulosic plant material substrate to achieve a substrate moisture level between 45% – 95%;~~

~~b) sterilising the substrate of a);~~

~~c) inoculating the sterile substrate with an active, edible, higher fungus;~~

~~d) incubating the inoculated substrate for a period of time to produce a fermented substrate.~~

~~59.~~ 13. The process of ~~claim 58~~any one of claims 5-12, wherein the ~~fungus used for inoculation in~~ incubation step ~~c~~d) is ~~added at an amount of 5-50% w/w of the hydrated lignocellulosic plant material~~performed under air flow.

~~60.~~ 14. The process of ~~claim 59~~any one of claims 5-13, wherein the ~~active fungus~~incubation step d) is ~~added at~~carried out in an ~~amount of 10-20% w/w.~~

~~61. The process of claim 58,~~incubation space wherein the ~~active, edible fungus utilised in the inoculation step are wood-decay or lignocolous fungi.~~

~~62. The process of claim 61, wherein the wood-decay or lignocolous fungi are white rot fungi.~~

~~63. The process of claim 62, wherein the white rot fungi are selected from the genera *Pleurotus, Lentinula, Ganoderma, Volvariella*, *Auricularia*, *Armillaria*, *Flammulina*, *Pholiota*, *Tremella*~~humidity is between 90% and~~/or *Hericium*.~~ 100%.

~~64. The process of claim 58 wherein the process includes the further step of drying or partially drying the fermented substrate.~~

~~65. The process of claim 64, wherein the fermented substrate is partially dried to form a paste.~~

~~66. The process of claim 64, wherein the fermented substrate is dried to form a free-flowing composition.~~

~~67. The process of claim 64, wherein the fermented substrate is dried in a solid form or three-dimensional shape.~~

~~68. A~~15. Use of a flour composition ~~produced by the process of claim 28~~according to any one of claims 1-4, or 7-8, for creating lower calories baked goods.

~~69. A~~16. Use of a flour composition according to any one of claims 1-4, or 7-8, to replace completely or partially traditional flours.

17.~~produced by~~ Use of a flour composition according to any one of claims 1-4, or 7-8, outside the ~~process of claim 58~~food industry as an ingredient in adhesive, industrial filler, binders and/or cosmetics, or to create biodegradable packing.