Claims to Polymeric Laminates, a Polymeric Storage Container for Harvested Agricultural Products and a System for Storage of Harvested Agricultural Products

What is claimed is:

1. A polymeric laminate comprising adapted to contact an insect of a given dimensional shape with a dose of an insecticide:

an innermost layer comprising a bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one insecticide, said bubbles having a shape and an inter-bubble distance adapted to resist the movement of said insect thereabout.

2. A polymeric laminate according to claim 1 wherein said insecticide is in powder form.

3. A polymeric laminate according to claim 1 wherein said insecticide comprises a material selected from the group consisting of diatomaceous earth and cuticle desiccants.

4. A polymeric laminate according to claim 1 wherein the burst strength of the thermoplastic bubbles of said bubble plastic thermoplastic polymeric material allows said insect to burst said thermoplastic bubbles so as to expose said insect to said at least one insecticide.

5. A polymeric laminate according to claim 1 wherein said bubble plastic thermoplastic polymeric material comprises a polymer selected from the group consisting of LDPE, VLDPE and polypropylene.

6. A polymeric laminate according to claim 1 additionally comprising a mesh material layer disposed adjacent said thermoplastic bubble layer, having openings of sufficient size to permit the partial passage of said insect through said mesh material so as to hold an insect of said dimensional shape.

7. A polymeric laminate according to claim 2 wherein the inter-layer distance between said bubble layer and said mesh material layer is less than the length of said insect so as to permit only the partial passage of said insect through said mesh material so as to hold an insect of said dimensional shape between said innermost layer and said mesh material layer.

8. A polymeric laminate according to claim 1, additionally comprising an outermost layer comprising a thermoplastic polymeric material containing at least one ultraviolet blocking material.

9. A polymeric laminate according to claim 1, additionally comprising a bio-composite absorbent layer comprising super-absorbent polymers, and a bio-composite compatibilizer layer comprising activated [bamboo] carbon and a compatibilizer.

10. A polymeric laminate according to claim 1, additionally comprising a rodent repellent intermediate layer comprising a thermoplastic polymeric material, a rodent repellent material and ethyl vinyl acetate.

11. A polymeric laminate according to claim 1, additionally comprising an oxygen barrier intermediate layer comprising ethylene vinyl alcohol and EMMA inorganic/organic additives.

12. A polymeric laminate according to claim 1, additionally comprising:

a) an outermost layer comprising a woven thermoplastic polymeric material containing at least one rodent repellent material and an ultraviolet blocking material, and a layer comprising at least one pesticide and/or insecticide;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers: a bio-

composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

13. A polymeric laminate according to claim 1, wherein said bio-composite layer of an HDPE mesh containing at least one super-absorbent polymer, and a second layer comprising an HDPE mesh containing a biocomposite material and activated bamboo carbon.

14. A polymeric laminate polymeric laminate according to claim 1 comprising:

a) an outermost layer comprising a thermoplastic polymeric material containing at least one rodent repellent material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a woven thermoplastic polymeric material;

d) a bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one insecticide; and

e) a bio-composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

Polymeric Laminate – Coextruded Version

15. A polymeric laminate comprising:

a) an outermost layer comprising a thermoplastic polymeric material containing at least one rodent repellent material, at least one pesticide and/or insecticide and an ultraviolet blocking material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed

between said outermost layer and innermost layers, the following layers:

c) an oxygen barrier intermediate layer comprising a thermoplastic polymeric material containing at least one additive that functions as a desiccant, a free radical scavenger or an oxygen barrier; and

d) a bio-composite absorbent/compatibilizer layer comprising a thermoplastic polymeric material containing at least one super-absorbent polymer and activated carbon.

16. A polymeric laminate according to claim 15 wherein said outermost layer comprises a first layer comprising a polyolefin, a rodent repellent and an ultraviolet blocking material; and a second layer comprising a thermoplastic polymeric material and at least one insecticide or pesticide material.

17. A polymeric laminate according to claim 15 wherein said bio-composite absorbent/compatibilizer layer comprises a first layer comprising at least one super-absorbent polymer; and a second layer comprising activated bamboo carbon.

18. A polymeric laminate according to claim 15 wherein said outermost layer comprises a polyolefin selected from the group consisting of polypropylene, HDPE, LDPE, LLDPE, VLDPE and copolymers and homoploymers thereof.

19. A polymeric laminate according to claim 15 wherein said outermost layer comprises a rodent repellent selected from the group consisting of synthetic pyrethroids, such as permethrin.

20. A polymeric laminate comprising:

a) an outermost layer comprising a polyolefin, a rodent repellent and an ultraviolet blocking material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed

between said outermost layer and innermost layers, the following layers:

c) an insecticide/pesticide intermediate layer comprising a thermoplastic polymeric material and either an insecticide or a pesticide material;

d) an oxygen barrier intermediate layer comprising ethylene vinyl alcohol and EMMA and inorganic/organic additives;

e) a bio-composite absorbent layer comprising super-absorbent polymers; and

f) a bio-composite compatibilizer layer comprising activated bamboo carbon and a compatibilizer.

21. A polymeric laminate according to claim 20 wherein said outermost layer comprises a polyolefin selected from the group consisting of polypropylene, HDPE, LDPE, LLDPE, VLDPE and copolymers and homoploymers thereof.

22. A polymeric laminate according to claim 20 wherein said outermost layer comprises a rodent repellent selected from the group consisting of synthetic pyrethroids, such as permethrin.

23. A polymeric laminate according to claim 20 wherein said bio-composite compatibilizer layer comprises activated carbon selected from the group consisting of bamboo activated carbons.

24. A polymeric laminate according to claim 20 wherein said bio-composite compatibilizer layer comprises a compatibilizer selected from the group consisting of chitin and citric acid.

Polymeric Laminate – Version 2

25. A polymeric laminate comprising:

a) an outermost layer comprising a polyolefin, an insecticide/pesticide material, a cuticle desiccant and an ultraviolet blocking material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a rodent repellent intermediate layer comprising a thermoplastic polymeric material, a rodent repellent material and ethyl vinyl acetate;

d) an oxygen barrier intermediate layer comprising ethylene vinyl alcohol and EMMA inorganic/organic additives;

e) a bio-composite absorbent layer comprising super-absorbent polymers; and

f) a bio-composite compatibilizer layer comprising activated bamboo carbon and a compatibilizer.

Polymeric Laminate – Mesh Version

26. A polymeric laminate comprising:

a) an outermost layer comprising a woven thermoplastic polymeric material containing at least one rodent repellent material and an ultraviolet blocking material, and a layer comprising at least one pesticide and/or insecticide;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a bio-composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

27. A polymeric laminate according to claim 26 [Figure 2 detailed] wherein said bio-composite layer of an HDPE mesh containing at least one super-absorbent polymer, and a second layer comprising an HDPE mesh containing a biocomposite material and

activated bamboo carbon.

28. A polymeric laminate comprising:

a) an outermost layer comprising a thermoplastic polymeric material containing at least one rodent repellent material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a woven thermoplastic polymeric material;

d) a thermoplastic polymer layer containing at least one pesticide and/or insecticide;

e) a bio-composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

29. A polymeric laminate according to claim 28 [Figure 2a detailed] wherein said bio-composite layer of an HDPE mesh containing at least one super-absorbent polymer, and a second layer comprising an HDPE mesh containing a biocomposite material and activated bamboo carbon.

30. A polymeric laminate comprising:

a) an outermost layer comprising a woven thermoplastic polymeric material containing at least one rodent repellent material and an ultraviolet blocking material, and a layer comprising at least one pesticide and/or insecticide;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a bio-composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

31. A polymeric laminate comprising:

a) an outermost layer comprising a thermoplastic polymeric material containing at least one ultraviolet blocking material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a first bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one rodent repellent material;

d) a second bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one pesticide and/or insecticide;

e) a non-woven or other equivalent layer, such as a filter membrane, that encapsulates cellulosic or other naturally absorbent materials and/or superabsorbent polymers

f) an optional bio-composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

32. A polymeric laminate according to claim 31 additionally comprising a layer of a thermoplastic polymeric material containing calcium carbonate or equivalent material as a filler/blocking agent, and disposed between said second bubble plastic thermoplastic polymeric material layer and said a non-woven or other equivalent layer.

33. A polymeric laminate according to claim 31 wherein said first bubble plastic layer comprises a polymer selected from the group consisting of LDPE, VLDPE, polypropylene or other suitable polymeric material, adhered to said outermost layer by an adhesive such as EVOH, and wherein second bubble plastic layer bubbles are provided with an insecticide in powder form, such as diatomaceous earth or other cuticle desiccant.

34. A polymeric laminate according to claim 31 wherein said first bubble plastic layer comprises a polymer selected from the group consisting of LDPE, VLDPE, polypropylene or other suitable polymeric material, adhered to said outermost layer by an adhesive such as EVOH, and wherein second bubble plastic layer bubbles are provided with an insecticide in powder form, such as diatomaceous earth or other cuticle desiccant.

35. A polymeric laminate comprising:

a) an outermost layer comprising a thermoplastic polymeric material containing at least one ultraviolet blocking material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a first bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one rodent repellent material;

d) a second bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one pesticide and/or insecticide;

e) a bio-composite absorbent layer comprising [super-absorbent polymers]; and

f) a bio-composite compatibilizer layer comprising activated [bamboo] carbon and a compatibilizer.

A Polymeric Storage Container for Harvested Agricultural Products

36. A polymeric storage container for harvested agricultural products, said container comprising a polymeric laminate according to any of claims 1 through 21.

System for Storage of Harvested Agricultural Products

37. A system for storage of harvested agricultural products said system comprising a

container made from a polymeric laminate according to any of claims 1 through 21.

Bubble Plastic Material with Insecticide laminate

38. A polymeric laminate comprising adapted to contact an insect of a given dimensional shape with a dose of an insecticide:
an innermost layer comprising a bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one insecticide, said bubbles having a shape and an inter-bubble distance adapted to resist the movement of said insect thereabout.

39. A polymeric laminate according to claim 38 wherein said insecticide is in powder form.

40. A polymeric laminate according to claim 38 wherein said insecticide comprises a material selected from the group consisting of diatomaceous earth and cuticle desiccants.

41. A polymeric laminate according to claim 38 wherein the burst strength of the thermoplastic bubbles of said bubble plastic thermoplastic polymeric material allows said insect to burst said thermoplastic bubbles so as to expose said insect to said at least one insecticide.

42. A polymeric laminate according to claim 38 wherein said bubble plastic thermoplastic polymeric material comprises a polymer selected from the group consisting of LDPE, VLDPE and polypropylene.

43. A polymeric laminate according to claim 38 additionally comprising a mesh material layer disposed adjacent said thermoplastic bubble layer, having openings of sufficient size to permit the partial passage of said insect through said mesh material so as to hold an insect of said dimensional shape.

44. A polymeric laminate according to claim 39 wherein the inter-layer distance between said bubble layer and said mesh material layer is less than the length of said insect so as to permit only the partial passage of said insect through said mesh material so as to hold an insect of said dimensional shape between said innermost layer and said mesh material layer.

45. A polymeric laminate according to claim 38, additionally comprising an outermost layer comprising a thermoplastic polymeric material containing at least one ultraviolet blocking material.

46. A polymeric laminate according to claim 38, additionally comprising a bio-composite absorbent layer comprising super-absorbent polymers, and a bio-composite compatibilizer layer comprising activated [bamboo] carbon and a compatibilizer.

47. A polymeric laminate according to claim 38, additionally comprising a rodent repellent intermediate layer comprising a thermoplastic polymeric material, a rodent repellent material and ethyl vinyl acetate.

48. A polymeric laminate according to claim 38, additionally comprising an oxygen barrier intermediate layer comprising ethylene vinyl alcohol and EMMA inorganic/organic additives.

49. A polymeric laminate according to claim 38, additionally comprising:

a) an outermost layer comprising a woven thermoplastic polymeric material containing at least one rodent repellent material and an ultraviolet blocking material, and a layer comprising at least one pesticide and/or insecticide;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers: a bio-

composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

50. A polymeric laminate according to claim 49, wherein said bio-composite layer of an HDPE mesh containing at least one super-absorbent polymer, and a second layer comprising an HDPE mesh containing a biocomposite material and activated bamboo carbon.

51. A polymeric laminate polymeric laminate according to claim 49 comprising:

a) an outermost layer comprising a thermoplastic polymeric material containing at least one rodent repellent material;

b) an innermost layer comprising a food grade polymer and an adhesive; and, interposed between said outermost layer and innermost layers, the following layers:

c) a woven thermoplastic polymeric material;

d) a bubble plastic thermoplastic polymeric material layer comprising bubbles containing at least one insecticide; and

e) a bio-composite layer comprising a thermoplastic yarn mesh containing at least one super-absorbent polymer and activated carbon.

Claims

1. A polymeric laminate comprising:

a layer comprising a thermoplastic polymeric material, said thermoplastic polymeric material defining a plurality of spaces containing one or more pesticides or insecticides, so as to be capable of releasing one or more said pesticides or insecticides upon penetration of said thermoplastic polymeric material.

2. A polymeric laminate comprising:

a) an active ingredient layer comprising a thermoplastic polymeric material, said thermoplastic polymeric material defining a plurality of spaces containing an active ingredient so as to be capable of releasing said active ingredient upon penetration of said thermoplastic polymeric material; and

b) a first exterior layer comprising a food grade polymer.

3. A polymeric laminate according to claim 2, wherein said active ingredient is selected from the group consisting of pesticides and insecticides.

4. A polymeric laminate according to claim 2, wherein said thermoplastic polymeric material contains one or more rodent repellent materials.

5. A polymeric laminate according to claim 3 adapted to penetration by an insect, wherein said thermoplastic polymeric material is in the form of a bubble plastic comprising bubbles wherein the burst strength of said bubbles allows said insect to burst said thermoplastic bubbles so as to expose said insect to said one or more pesticides or insecticides.

6. A polymeric laminate according to claim 5 adapted to resist the movement of an insect, wherein said thermoplastic polymeric material is in the form of a bubble plastic comprising bubbles containing one or more said insecticides or pesticides, said bubbles having a shape and an inter-bubble distance adapted to resist the movement of said insect thereabout.

7. A polymeric laminate according to claim 3, wherein:

a) said first exterior layer comprising a food grade polymer;

b) a second exterior layer comprises a thermoplastic polymeric material containing at least one rodent repellent material and an ultraviolet blocking material, and said active ingredient layer.

8. A polymeric laminate according to claim 7 wherein, additionally interposed between said first exterior layer and second exterior layer, is a mesh layer.

9. A polymeric laminate according to claim 7 wherein, additionally interposed between said first exterior layer and second exterior layer, is a non-woven layer.

10. A polymeric laminate according to claim 3, wherein said laminate comprises:

a) said first exterior layer comprising a food grade polymer;

b) a second exterior layer comprising said active ingredient layer, wherein thermoplastic polymeric material contains one or more rodent repellent materials and an ultraviolet blocking material; and, interposed between said first exterior layer and second exterior layer, the following additional layers:

c) an intermediate layer comprising a thermoplastic polymeric material containing one or more desiccants, free radical scavengers or oxygen barrier materials; and

d) a bio-composite absorbent/compatibilizer layer comprising a thermoplastic polymeric material containing a substance selected from the group consisting of super-absorbent polymers and activated carbon.

11. A polymeric laminate according to claim 10 wherein said second exterior layer comprises a polyolefin first layer comprising a polyolefin, a rodent repellent and an ultraviolet blocking material; and a thermoplastic second layer comprising a thermoplastic polymeric material and one or more insecticide or pesticide materials.

12. A polymeric laminate according to claim 10 wherein said bio-composite absorbent/compatibilizer layer comprises a first layer comprising one or more super-absorbent polymers; and a second layer comprising activated bamboo carbon.

13. A polymeric laminate according to claim 10 wherein said second exterior layer comprises a polyolefin selected from the group consisting of polypropylene, HDPE, LDPE, LLDPE, VLDPE and copolymers and homopolymers thereof, and combinations thereof.

14. A polymeric storage container for harvested agricultural products, said container comprising a polymeric laminate according to any of claims 1 through 13.

15. A system for storage of harvested agricultural products said system comprising a container made from a polymeric laminate according to any of claims 1 through 13.