WHAT IS CLAIMED IS:

1. A nucleic acid comprising a nucleotide sequence encoding an influenza hemagglutinin (HA) operatively linked to a regulatory region active in a plant.

2. The nucleic acid of claim 1, wherein the HA comprises a native or a non-native signal peptide.

3. The nucleic acid of claim 2, wherein the non-native signal peptide is a protein disulfide isomerase signal peptide.

4. The nucleic acid of claim 1, wherein the HA is a type A influenza, a type B influenza, or is a subtype of type A influenza, selected from the group consisting of H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, and H16.

5. The nucleic acid of claim 1, wherein the HA is from a type A influenza, selected from the group consisting of H1, H2, H3, H5, H6, H7 and H9.

6. A method of producing influenza virus like particles (VLPs) in a plant comprising:

a) introducing the nucleic acid of claim 1 into the plant, or portion of the plant, and

b) incubating the plant or portion of the plant under conditions that permit the expression of the nucleic acid, thereby producing the VLPs.

7. The method of claim 6, wherein in the step of introducing (step a), the nucleic acid is transiently expressed in the plant.

8. The method of claim 6, wherein, in the step of introducing (step a), the nucleic acid is stably expressed in the plant.

9. The method of claim 6 further comprising a step of

c) harvesting the host and purifying the VLPs.

10. The method of claim 6, wherein, in the step of introducing (step a), a second nucleic acid comprising a nucleotide sequence encoding one or more than one chaperone proteins is introduced to the plant.

11. The method of claim 10, wherein the one or more than one chaperon proteins is selected from the group consisting of Hsp40 and Hsp70.

12. A method of producing influenza virus like particles (VLPs) in a plant comprising:

a) providing a plant, or a portion of a plant, comprising the nucleic acid of claim 1, and

b) incubating the plant or portion of the plant under conditions that permit the expression of the nucleic acid, thereby producing the VLPs

13. A plant comprising the nucleic acid of claim 1.

14. The plant of claim 13, further comprising a nucleic acid comprising a nucleotide sequence encoding one or more than one chaperone proteins operatively linked to a regulatory region active in a plant.15. The plant of claim 14, wherein the one or more than one chaperone proteins is selected from the group consisting of Hsp40 and Hsp70.

16. A virus like particle (VLP) comprising an influenza virus hemagglutinin (HA) protein and one or more than one lipid derived from a plant.

17. The virus like particle (VLP) of claim 16, wherein the HA is a type A influenza, a type B influenza, or is a subtype of type A influenza HA selected from the group consisting of H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, and H16.

18. The VLP of claim 17, wherein the HA is from a type A influenza, selected from the group consisting of H1, H2, H3, H5, H6, H7 and H9.

19. A composition comprising an effective dose of the VLP of claim 16 and a pharmaceutically acceptable carrier.

20. A method of inducing immunity to an influenza virus infection in a subject, comprising administering the virus like particle of claim 16.

21. The method of claim 20, wherein the virus like particle is administered to a subject orally, intradermally, intranasally, intramusclarly, intraperitoneally, intravenously, or subcutaneously.

22. A virus like particle (VLP) comprising an influenza virus HA bearing plant-specific N-glycans, or modified N-glycans.

23. The virus like particle (VLP) of claim 22, wherein the HA is a type A influenza, a type B influenza, or is a subtype of type A influenza HA selected from the group consisting of H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, and H16.

24. The VLP of claim 23, wherein the HA is from a type A influenza, selected from the group consisting of H1, H2, H3, H5, H6, H7 and H9.

25. A composition comprising an effective dose of the VLP of claim 22 and a pharmaceutically acceptable carrier.

26. A method of inducing immunity to an influenza virus infection in a subject, comprising administering the composition of claim 25.

27. The method of claim 26, wherein the composition is administered to a subject orally, intradermally, intranasally, intramusclarly, intraperitoneally, intravenously, or subcutaneously.

WHAT IS CLAIMED IS:

1. A nucleic acid comprising a nucleotide sequence encoding an influenza hemagglutinin (HA) wherein the nucleotide sequence comprises a regulatory element that is operative in a plant, the regulatory element comprising a Cowpea Mosaic Virus (CPMV) regulatory region.

2. A nucleic acid comprising a nucleotide sequence encoding a type B influenza hemagglutinin (HA) operatively linked to a Cowpea Mosaic Virus (CPMV) regulatory region.

3. The nucleic acid of claims 1 or 2, wherein the HA comprises a native or a non-native signal peptide.

4. The nucleic acid of claim 3, wherein the non-native signal peptide is a protein disulfide isomerase signal peptide.

5. The nucleic acid of claim 1, wherein the HA is from a type A influenza selected from the group consisting of H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, and H16.

6. The nucleic acid of claims 1, wherein the HA is from a type A influenza, selected from the group consisting of H1, H2, H3, H5, H6, H7 and H9.

7. The nucleic acid of claim 1, wherein the nucleotide sequence encoding the influenza hemagglutinin (HA) has 70%-100% sequence identity with the nucleotide sequence of SEQ ID NO: 11, SEQ ID NO:12, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 15, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21, SEQ ID NO: 22, SEQ ID NO: 23, SEQ ID NO: 24, SEQ ID NO: 25, SEQ ID NO: 26, SEQ ID NO:27, SEQ ID NO: 28, SEQ ID NO: 33, SEQ ID NO: 35, SEQ ID NO: 36, SEQ ID NO:37, SEQ ID NO:38, SEQ ID NO:39, SEQ ID NO:40, SEQ ID NO:41, SEQ ID NO:42, SEQ ID NO:43, SEQ ID NO:44, SEQ ID NO:45, SEQ ID NO:46 or SEQ ID NO:47.

8. A method of producing an influenza virus like particle (VLP) in a transgenic plant comprising:

a) introducing the nucleic acid of any one of claims 1 to 7 into a plant, or portion of a plant by genetic transformation, thereby producing the transgenic plant and

b) incubating the transgenic plant or portion of the plant under conditions that permit the expression of the nucleic acid, thereby producing the VLP.

9. The method of claim 8, wherein in the step of introducing (step a), the nucleic acid is transiently expressed in the plant.

10. The method of claim 8, wherein, in the step of introducing (step a), the nucleic acid is stably expressed in the plant.

11. The method of any one of claims 7 to 9, wherein, in the step of introducing (step a), a second nucleic acid comprising a nucleotide sequence encoding one or more than one chaperone proteins is introduced to the plant.

12. The method of claim 11, wherein the one or more than one chaperone proteins is selected from the group consisting of Hsp40 and Hsp70.

13. A method of producing an influenza virus like particle (VLP) in a transgenic plant comprising:

a) providing a transgenic plant, or a portion of a plant, comprising the nucleic acid of any one of claims 1 to 7, and

b) incubating the transgenic plant or portion of the plant under conditions that permit the expression of the nucleic acid, thereby producing the VLP

14. The method of claim 8 or 13 further comprising a step of

c) harvesting the plant and purifying the VLP.

15. The method of claim 14, wherein the VLP range in size from 80-300 nm.

16. A plant cell comprising the nucleic acid of any one of claims 1 to 7.

17. The plant cell of claim 16, further comprising a nucleic acid comprising a nucleotide sequence encoding one or more than one chaperone proteins operatively linked to a regulatory region active in a plant.

18. The plant cell of claim 17, wherein the one or more than one chaperone proteins is selected from the group consisting of Hsp40 and Hsp70.

19. A virus like particle (VLP) produced by the method of any one of claims 14 or 15, comprising an influenza virus hemagglutinin (HA) protein and one or more than one lipid derived from a plant.

20. The VLP of claim 19, wherein the type A influenza, is a subtype selected from the group consisting of H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, and H16.

21. The VLP of claim 20, wherein the HA is from a type A influenza, selected from the group consisting of H1, H2, H3, H5, H6, H7 and H9.

22. A composition comprising an effective dose of the VLP of claim 19 for inducing immunity to an influenza virus in a subject and a pharmaceutically acceptable carrier.

23. A use of the VLP of claim 19 for inducing immunity to an influenza virus infection in a subject.

24. A use of the VLP of claim 19 for the preparation of a medicament for inducing immunity to an influenza virus infection in a subject.

25. The VLP of claim 19 for use in inducing immunity to an influenza virus infection in a subject.

26. The use as defined in any one of claims 23, 24, or the VLP of claim 25, wherein the VLP is administrable to the subject orally, intradermally, intranasally, intramusclarly, intraperitoneally, intravenously, or subcutaneously.

27. A VLP produced by the method of claim 14 or 15, comprising an influenza virus HA bearing plant-specific N-glycans, or modified N-glycans.

28. The VLP of claim 27, wherein the type A influenza is a subtype selected from the group consisting of H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, and H16.

29. The VLP of claim 28, wherein the HA is from a type A influenza, selected from the group consisting of H1, H2, H3, H5, H6, H7 and H9.

30. A composition comprising an effective dose of the VLP of claim 27 for inducing immunity to an influenza virus in a subject, and a pharmaceutically acceptable carrier.

31. A use of the composition of claim 30 for inducing immunity to an influenza virus infection in a subject.

32. A use of the composition of claim 30 for the preparation of a medicament for inducing immunity to an influenza virus infection in a subject.

33. The composition of claim 30 for use in inducing immunity to an influenza virus infection in a subject.

34. The use of the composition as defined in any one of claims 31, 32 or the composition as defined in claim 33, wherein the composition is administrable to a subject orally, intradermally, intranasally, intramusclarly, intraperitoneally, intravenously, or subcutaneously.

35. The VLP of claim 19, wherein the one or more than one lipid is from the group phospatidycholine, phosphatidylethanolamine, glycosphingolipids, sphingolipid, and a combination thereof.

36. The VLP of any one of claims 19 or 35, further comprising one or more than one phytosterol, sterol, saponin, and a combination thereof.

37. The VLP of claim 36, wherein the phytosterol is from the group stigmasterol, sitosterol, beta-sitosterol, 24-methlycholesterol, cholesterol, and a combination thereof.

38. A nucleic acid comprising a nucleotide sequence having the sequence set forth in SEQ ID NO: 60-73, 81, 83, 86, 90, 94, 97, 100, 101, 104, 105, 108, 109, 112, or 113.

39. The nucleic acid of claim 38, wherein the SEQ ID NO is SEQ ID NO 60 or 61.

40. A method of producing an influenza virus like particle (VLP) in a transgenic plant comprising:

a) introducing the nucleic acid of claim 38 or 39 into the plant, or portion of the plant, by genetic transformation, thereby producing the transgenic plant and

b) incubating the transgenic plant or portion of the plant under conditions that permit the expression of the nucleic acid, thereby producing the VLP.

41. A method of producing an influenza virus like particle (VLP) in a transgenic plant comprising:

a) introducing the nucleic acid of claim 38 and a nucleic acid having the sequence of SEQ ID NO: 122 or SEQ ID NO: 123 into a plant, or portion of the plant, by genetic transformation, thereby producing the transgenic plant and

b) incubating the transgenic plant or portion of the plant under conditions that permit the co-expression of the nucleic acids, thereby producing the VLP.

42. The method of any one of claims 8 to 15, 40 or 41 wherein, in the step of introducing (step a), an additional nucleic acid sequence encoding a suppressor of silencing is introduced into the plant.

43. The method of claim 42 wherein, the suppressor of silencing is selected from potato virus HcPro, tobacco etch virus p1/HC-Pro (TEV-p1/HC-Pro), BYV-p21, tomato bushy stunt virus-p19 (TBSV-p19), capsid protein of tomato crinkle virus (TCV-CP), cucumber mosaic virus-2b (CMV-2b) potato virus X-p25 (PVX-p25) potato virus M-p11 (PVM-p11), potato virus S-p11 (PVS-p11), blueberry scorch virus-p16 (BScV-p16), citrus trieza virus-p23 (CTV-p23), grapevine leafroll-associated virus-2-p14 (GVB-p14), grapevine virus A-p10 (GVA-p10), grapevine virus B-p14 (GVB-p14), heracleum latent virus-p10 (HLV-p10), and garlic common latent virus-p16 (GCLV-p16).

44. The method of any one of claims 8-15, 40-43, wherein, in the step of introducing (step a), a further nucleic acid sequence encoding beta-1.4 galactosyltransferase (GalT), N-acetylglucoaminyltransferase III (GnT-III), GalT- N-acetylglucosaminyl transferase (GalT-GNT1) hybrid enzyme, a GNT1-GnT-III hybrid enzyme, is introduced into the plant.

45. A use of the VLP of any one of claims 19-21, for preparing a sera comprising antibodies specific against influenza hemagglutinin (HA).

46. A polyclonal antibody prepared using the VLP as described in any one of claims 19, 27, 35, 36 or 37, wherein the antibody is specific against influenza hemagglutinin (HA).

47. A plant extract comprising a VLP produced by the method of any one of claims 8 to 15, 40, or 41 to 44.

48. A composition comprising plant extract comprising a VLP produced by the method of any one of claims 8 to 15, 40, or 41 to 44 , and a pharmaceutical acceptable carrier.

49. A plant cell comprising a VLP produced by the method of any one of claims 8 to 15, 40, or 41 to 44.

50. The plant extract of claim 47, the composition of claim 48, or the plant cell of claim 49, for use in inducing immunity to an influenza virus infection in a subject.

51. A use of the plant extract of claim 47, the composition of claim 48, or the plant cell of claim 49 for inducing immunity to an influenza virus infection in a subject, wherein the VLP is suitable for oral administration.

52. A food supplement comprising the plant extract of claim 47 or the plant cell of claim 49.