Claims

What is claimed is:

1. A bacterial host cell comprising one or more vectors comprising a polynucleotide sequence encoding:

   genes of the mevalonate pathway; and one or more genes of the Nudix pathway, wherein the one or more genes of the Nudix pathway is *NUDX1*.

2. The host cell according to any one of claim 1, wherein the host cell comprises two vectors, wherein
   a. a first vector comprising a polynucleotide sequence encoding one or more genes of the mevalonate pathway; and
   b. a second vector comprising a polynucleotide sequence encoding one or more genes of the Nudix pathway, wherein the one or more genes of the Nudix pathway is *NUDX1*.
3. The host cell according to claims 1 or 2, wherein the genes of the mevalonate pathway are HMG-CoA synthase (*hmgS*), acetoacetyl-CoA thiolase (*atoB*), HMG-CoA reductase (*hmgR*), mevalonate kinase (*mevK*), phosphomevalonate kinase (*pmk*), mevalonate pyrophosphate decarboxylase (*pmd*) and (isopentenyl diphosphate) IPP isomerase (*idi*).
4. The host cell according to claim 3, wherein the *hmgR* gene is truncated.
5. The host cell according to any one of claims 2 to 4, wherein the second vector further comprises a polynucleotide sequence encoding one or more diphosphate synthase genes, prenyltransferase genes or combinations thereof in the host cell.
6. The host cell according to any one of claims 2 to 5, wherein the polynucleotide sequence in each of the vectors is operably linked to an inducible promoter, wherein the inducible promoter is a wild-type T7 RNA polymerase promoter or a variant of the wild-type T7 RNA polymerase promoter.
7. The host cell according to any one of claims 2 to 6, wherein the first vector comprises

   a. a polynucleotide sequence encoding the *hmgS*, *atoB*, *hmgR* genes of the mevalonate pathway operably linked to a first inducible promoter; and

   b. a polynucleotide sequence encoding the *mevK*, *pmk*, *pmd* and *idi* genes of the mevalonate pathway operably linked to a second inducible promoter.

8. The host cell according to any one of claims 5 to 7, wherein the second vector further comprises a polynucleotide sequence encoding a ribosomal binding site (RBS) that is located upstream of the polynucleotide sequence encoding the polynucleotide sequence encoding the Nudix pathway gene, the polynucleotide sequence encoding the diphosphate synthase gene or prenyltransferase gene, or combinations thereof.
9. The host cell according to claim 8, wherein the polynucleotide sequence encoding the RBS in the second vector is selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 4 and SEQ ID NO: 5
10. The host cell according to any one of claims 5 to 9, wherein the diphosphate synthase or the prenyltransferase is a geranyl pyrophosphate synthase (GPPS) or a farnesyl diphosphate synthase (FPPS).
11. The host cell according to claim 10, wherein the GPPS is isolated from *Abies grandis* (AgGPPS).
12. The host cell according to claim 11, wherein the AgGPPS is truncated at the N-terminal.
13. The host cell according to claim 12, wherein the truncated AgGPPS comprises the polypeptide sequence as set forth in SEQ ID NO: 7.
14. The host cell according to claim 10, wherein the FPPS is isolated from *Saccharomyces cerevisiae* or *Escherichia coli.*
15. The host cell according to claim 14, wherein the FPPS is mutated at one or more amino acid positions.
16. The host cell according to claim 15, wherein the mutated FPPS from *Escherichia coli* comprises the polypeptide sequence as set forth in SEQ ID NO. 9, and wherein the mutated FPPS from *Saccharomyces cerevisiae* comprises the polypeptide sequence as set forth in SEQ ID NO. 11, SEQ ID NO. 12, or SEQ ID NO. 13.
17. The host cell according to any one of claims 1 to 16, wherein the *NUDX1* is isolated from a plant.
18. The host cell according to claim 17, wherein the *NUDX1* is isolated from *Rosa hybrida* and encodes a polypeptide sequence that has about 70%, 80%, 90% or 100% identity with the polypeptide sequence set forth in SEQ ID NO: 14, or

wherein the *NUDX1* is isolated from *Arabidopsis thaliana* and encodes a polypeptide sequence that has about 70%, 80%, 90% or 100% identity with the polypeptide sequence set forth in SEQ ID NO: 15.

19. The host cell according to any one of claims 5 to 18, wherein the *NUDX1* is co-expressed with the diphosphate synthase or the prenyltransferase.
20. The host cell according to any one of claims 5 to 19, wherein the second vector further comprises one or more of:
    a. a polynucleotide sequence encoding a geranyl synthase enzyme (GES) isolated from a plant, wherein the polynucleotide sequence encoding the GES is located upstream of the polynucleotide sequence encoding the diphosphate synthase or the prenyltransferase, and wherein the GES is co-expressed with the diphosphate enzyme or the prenyltransferase, and/or the nudix enzyme;
    b. a polynucleotide sequence encoding a multiple antibiotic resistance protein (MarA) which is located downstream of the polynucleotide sequence encoding the diphosphate synthase or the prenyltransferase; or
    c. a polynucleotide sequence encoding an alcohol acyltransferase (AAT) enzyme which is located downstream of the polynucleotide sequence encoding the diphosphate synthase or the prenyltransferase; or combinations thereof.
21. The host cell according to any one of claims 1 to 20, wherein the host cell is deficient in the *pta* gene, the *ackA* gene or the *ackA* and *pta* genes.
22. The host cell according to any one of claims 1 to 21, wherein the host cell is deficient in at least one gene involved in amino acid synthesis, oxidation of terpenoids, amino acid degradation or a combination thereof.
23. The host cell according to claim 22, wherein the host cell is deficient in *aroA*, *serC*, *yjgB* and *tnaA* genes, or wherein the host cell is deficient in *aroA*, *serC* and *tnaA* genes.
24. The host cell according to claim 1, wherein the bacterial cell is an *Escherichia coli* cell.
25. A method of geraniol, geranyl acetate, or geraniol and geranyl acetate production comprising culturing the host cell according to claim 1in a culture medium, wherein the host cell further comprises a polynucleotide sequence that encodes:

one or more diphosphate synthase genes, prenyltransferase genes or combinations thereof; and

one or more alcohol acyltransferase (AAT) genes,

wherein the culture medium comprises an inducer and at least one carbon substrate.

26. The method according to claim 25, wherein the inducer is lactose or IPTG, and wherein the at least one carbon substrate is selected from the group consisting of glucose, glycerol, lactose, sucrose and combinations thereof.
27. A kit for producing geraniol, geranyl acetate, or geraniol and geranyl acetate, wherein the kit comprises the host cell of any one of claims 1 to 24 with instructions for use.
28. The kit according to claim 27, wherein the host cell is dissolved in solution or lyophilized.
29. The kit according to claim 28, wherein the host cell is preserved by deep freezing.