SUMMARY

[0004a] In one aspect, provided herein is 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*.

[0004b] In another aspect, provided herein is a method of geraniol, geranyl acetate, or geraniol and geranyl acetate production comprising culturing the host cell as described herein in 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.

[0005] In one aspect, provided herein is a host cell comprising one or more vectors comprising a polynucleotide sequence encoding: one or more genes of the mevalonate pathway; and one or more genes of the Nudix pathway.

[0006] In another aspect, provided herein is an engineered fusion protein comprising a diphosphate synthase or prenyltransferase of the mevalonate pathway and a nudix hydrolase; or a diphosphate synthase or prenyltransferase of the mevalonate pathway, a nudix hydrolase and a geranyl synthase enzyme (GES) of the terpene synthase pathway; or a diphosphate synthase or prenyltransferase of the mevalonate pathway and a GES of the terpene synthase pathway.

[0007] In another aspect, provided herein is a method of geraniol, geranyl acetate, or geraniol and geranyl acetate production comprising culturing the host cell as described herein in a culture medium, wherein the culture medium comprises an inducer and at least one carbon substrate.

[0008] In another aspect, provided herein is a kit for producing geraniol, geranyl acetate, or geraniol and geranyl acetate, wherein the kit comprises the host cell as described herein with instructions for use.

DEFINITIONS

[0009] As used herein, the term “isoprenoid” refers to a large and diverse class of naturally-occurring class of organic compounds composed of two or more units of hydrocarbons, with each unit consisting of five carbon atoms arranged in a specific pattern.

[0010] As used herein, the term “monoterpene” or “monoterpenoids” are a class of isoprenoids produced from geranyl diphosphate by various monoterpene synthases. Monoterpenoids have two isoprenoid units. Monoterpenes are secondary metabolites in plants and the main constituents of essential oils, cosmetics, food flavorings, cleaning products and drugs. They contribute to the specific smell characters of plants. Monoterpenes are industrially used as flavour, fragrant, and cosmetic constituents. Moreover, they are precursors of several flavour compounds such as citronellol, geraniol, menthol, and verbenol.

[0011] As used herein, the term “mevalonate pathway” refers to a cellular metabolic pathway that plays a key role in multiple cellular processes by synthesizing sterol isoprenoids, such as cholesterol, and non-sterol isoprenoids, such as dolichol, heme-A,