CLAIMS

1. A mutant, non-naturally occurring or transgenic plant cell comprising:

(i) at least one polynucleotide comprising, consisting or consisting essentially of a sequence encoding an isopropylmalate synthase and having at least 60% sequence identity to SEQ ID NO:1 or SEQ ID NO:10 or SEQ ID NO: 12 or SEQ ID NO:14; or

(ii) a polypeptide encoded by said polynucleotide(s); or

(iii) a polypeptide having at least 60% sequence identity to SEQ ID NO:2 or SEQ ID NO:11 or SEQ ID NO:13 or SEQ ID NO:15; or

(iv) a construct, vector or expression vector comprising said polynucleotide sequence(s), optionally wherein said construct, vector or expression vector additionally comprises a promoter comprising, consisting or consisting essentially of the sequence set forth in SEQ ID NO:8 or a variant thereof with at least about 60% identity thereto or a trichome promoter or a naturally occurring isopropylmalate synthase promoter.

2. A mutant, non-naturally occurring or transgenic plant comprising the plant cell according to claim 1.

3. A method for modulating the quantity or type of sucrose esters in at least a part of a plant, comprising the steps of:

(i) modulating the expression or activity of isopropylmalate synthase in the plant, preferably, wherein the isopropylmalate synthase comprises a polynucleotide comprising, consisting or consisting essentially of a sequence encoding isopropylmalate synthase and having at least 60% sequence identity to SEQ ID NO:1 or SEQ ID NO:10 or SEQ ID NO: 12 or SEQ ID NO:14; or is encoded by a polypeptide encoded by said polynucleotide(s); or wherein the isopropylmalate synthase is encoded by a polypeptide having at least 60% sequence identity to SEQ ID NO:2 or SEQ ID NO:11 or SEQ ID NO:13 or SEQ ID NO:15;

(ii) optionally measuring the quantity or determining the type of one or more sucrose esters in at least a part of the mutant, non-naturally occurring or transgenic plant obtained in step (i); and

(iii) identifying a mutant, non-naturally occurring or transgenic plant in which the quantity or type of the one or more sucrose esters therein has changed in comparison to a control plant in which the expression or activity of isopropylmalate synthase has not been modulated and, preferably, wherein the visual appearance of said mutant, non-naturally occurring or transgenic plant is substantially the same as the control plant.

4. A mutant, non-naturally occurring or transgenic plant that is obtained or obtainable by

the method according to claim 3.

5. A mutant, non-naturally occurring or transgenic plant, wherein expression of isopropylmalate synthase or the activity of the protein encoded thereby is modulated and at least a part of the plant has a change in the composition of one or more sucrose esters as compared to a control plant in which the expression or the activity of isopropylmalate synthase has not been modulated and wherein the visual appearance of said plant is substantially the same as the control plant.

6. Plant material including biomass, seed or leaves comprising cells or tissue from the plant according to claim 4 or claim 5.

7. A tobacco product comprising a part of the plant according to claim 4 or claim 5 or plant material according to claim 6.

8. A method for producing a composition comprising one or more sucrose esters comprising the steps of:
(i) providing at least part of a mutant, non-naturally occurring or transgenic plant according to claim 4 or claim 5, plant material according to claim 6 or the tobacco product according to claim 7;
(ii) extracting the sucrose ester(s) therefrom; and
(iii) optionally, isolating or purifying the extracted sucrose ester(s).

9. The method according to claim 3 or claim 8 or the mutant, non-naturally occurring or transgenic plant according to claims 4 or 5, wherein one or more of the sucrose esters has the structure as shown in Figure 5 and wherein R3 is acetyl or hydrogen, preferably acetyl; one or more of R1, R2 and R4 comprise an acyl chain with 6 carbons, preferably beta-methylvaleryl; and R5 is an acetyl or hydrogen, preferably, hydrogen.

10. A method for modulating the flavour of tobacco or a tobacco product comprising: (i) adding to tobacco or a tobacco product, a part of a plant, preferably leaves, from a mutant, non-naturally occurring or transgenic plant according to any of claims 2, 4 or 5 or plant material according to claim 6; or (ii) adding to tobacco or a tobacco product a composition comprising sucrose esters obtained or obtainable by the method of claims 8 or 9.

11. A method for producing beta-methylvaleric acid comprising the steps of:
(i) providing at least part of a mutant, non-naturally occurring or transgenic plant according

to any of claims 2, 4 or 5, the plant material according to claim 6 or the tobacco product according to claim 7;

(ii) hydrolysing the material or an extract thereof provided in step (i); and

(iii) optionally isolating or purifying the beta-methylvaleric acid.

12. An isolated polynucleotide comprising, consisting or consisting essentially of a sequence encoding an isopropylmalate synthase and having at least 60% sequence identity to SEQ ID NO:1 or SEQ ID NO:10 or SEQ ID NO: 12 or SEQ ID NO:14.

13. An isolated polypeptide encoded by the polynucleotide set forth in claim 12.

14. An isolated polypeptide having at least 60% sequence identity to SEQ ID NO:2 or SEQ ID NO:11 or SEQ ID NO:13 or SEQ ID NO:15.

15. A construct, vector or expression vector comprising the isolated polynucleotide sequence according to claim 12, optionally wherein said construct, vector or expression vector additionally comprises a promoter comprising, consisting or consisting essentially of the sequence set forth in SEQ ID NO:9 or a variant thereof with at least about 60% identity thereto or a trichome promoter or a natural isopropylmalate synthase promoter.

CLAIMS

1. A mutant, non-naturally occurring or transgenic plant cell comprising:

(i) at least one polynucleotide comprising, consisting or consisting essentially of a sequence encoding an isopropylmalate synthase and having at least 80% sequence identity to SEQ ID NO: 1 or SEQ ID NO: 10 or SEQ ID NO: 12 or SEQ ID NO: 14; or

(ii) a polypeptide encoded by the polynucleotide(s); or

(iii) a polypeptide having at least 80% sequence identity to SEQ ID NO: 2 or SEQ ID NO: 11 or SEQ ID NO: 13 or SEQ ID NO: 15; or

(iv) a construct, vector or expression vector comprising the polynucleotide sequence(s), optionally in which the construct, vector or expression vector additionally comprises a promoter comprising, consisting or consisting essentially of the sequence set forth in SEQ ID NO: 8 or a variant thereof with at least about 60% identity thereto or a trichome promoter or a naturally occurring isopropylmalate synthase promoter.

2. A mutant, non-naturally occurring or transgenic plant comprising a plant cell according to Claim 1.

3. A method for modulating the quantity or type of sucrose esters in at least a part of a plant, comprising the steps of:

(i) modulating the expression or activity of isopropylmalate synthase in the plant, in which the isopropylmalate synthase comprises a polynucleotide comprising, consisting or consisting essentially of a sequence encoding isopropylmalate synthase and having at least 80% sequence identity to SEQ ID NO: 1 or SEQ ID NO: 10 or SEQ ID NO: 12 or SEQ ID NO: 14; or is encoded by a polypeptide encoded by the polynucleotide(s); or in which the isopropylmalate synthase is encoded by a polypeptide having at least 80% sequence identity to SEQ ID NO: 2 or SEQ ID NO: 11 or SEQ ID NO: 13 or SEQ ID NO: 15;

(ii) optionally measuring the quantity or determining the type of one or more sucrose esters in at least a part of the mutant, non-naturally occurring or transgenic plant obtained in step (i); and

(iii) identifying a mutant, non-naturally occurring or transgenic plant in which the quantity or type of the one or more sucrose esters therein has changed in comparison to

a control plant in which the expression or activity of isopropylmalate synthase has not been modulated and, in which the visual appearance of the mutant, non-naturally occurring or transgenic plant is substantially the same as the control plant.

4. A mutant, non-naturally occurring or transgenic plant that is obtained or obtainable by a method according to Claim 3.

5. A mutant, non-naturally occurring or transgenic tobacco plant, in which expression of isopropylmalate synthase or the activity of the protein encoded thereby is modulated and at least a part of the tobacco plant has a change in the composition of one or more sucrose esters as compared to a control tobacco plant in which the expression or the activity of isopropylmalate synthase has not been modulated and in which the visual appearance of the tobacco plant is substantially the same as the control tobacco plant.

6. Plant material including biomass, seed or leaves comprising cells or tissue from a plant according to Claim 4 or Claim 5.

7. A tobacco product comprising a part of a plant according to Claim 4 or 5 or plant material according to Claim 6.

8. A method for producing a composition comprising one or more sucrose esters comprising the steps of:

(i) providing at least part of a mutant, non-naturally occurring or transgenic plant according to Claim 4 or Claim 5, plant material according to Claim 6 or a tobacco product according to Claim 7;

(ii) extracting the sucrose ester(s) therefrom; and

(iii) optionally, isolating or purifying the extracted sucrose ester(s).

9. A method according to Claim 3 or 8 or the mutant, non-naturally occurring or transgenic plant according to Claims 4 or 5, in which one or more of the sucrose esters has the structure as shown in Figure 5 and in which R3 is acetyl or hydrogen, preferably acetyl; one or more of R1, R2 and R4 comprise an acyl chain with 6 carbons, preferably beta-methylvaleryl; and R5 is an acetyl or hydrogen, preferably, hydrogen.

10. A method for modulating the flavour of tobacco or a tobacco product comprising: (i) adding to tobacco or a tobacco product, a part of a plant, preferably leaves, from a mutant,

non-naturally occurring or transgenic plant according to any of Claims 2, 4 or 5 or plant material according to Claim 6; or (ii) adding to tobacco or a tobacco product a composition comprising sucrose esters obtained or obtainable by a method according to Claims 8 or 9.

11. A method for producing beta-methylvaleric acid comprising the steps of:

(i) providing at least part of a mutant, non-naturally occurring or transgenic plant according to any of Claims 2, 4 or 5, plant material according to Claim 6 or a tobacco product according to Claim 7;

(ii) hydrolysing the material or an extract thereof provided in step (i); and

(iii) optionally isolating or purifying the beta-methylvaleric acid.

12. An isolated polynucleotide comprising, consisting or consisting essentially of a sequence encoding an isopropylmalate synthase and having at least 80% sequence identity to SEQ ID NO: 1 or SEQ ID NO: 10 or SEQ ID NO: 12 or SEQ ID NO: 14.

13. An isolated polypeptide encoded by a polynucleotide set forth in Claim 12.

14. An isolated polypeptide having at least 80% sequence identity to SEQ ID NO: 2 or SEQ ID NO: 11 or SEQ ID NO: 13 or SEQ ID NO: 15.

15. A construct, vector or expression vector comprising an isolated polynucleotide sequence according to Claim 12, optionally in which the construct, vector or expression vector additionally comprises a promoter comprising, consisting or consisting essentially of the sequence set forth in SEQ ID NO: 9 or a variant thereof with at least about 60% identity thereto or a trichome promoter or a natural isopropylmalate synthase promoter.