SEQUENCE LISTING

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<120> METHODS FOR PRODUCTION OF OXYGENATED TERPENES

<130> MAN-004PC2

<150> US 62/040,284
<151> 2014-08-21

<160> 118

<170> PatentIn version 3.5

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<212> PRT
<213> Vitis vinifera

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Phe Ile Thr Tyr Thr Pro Glu Asp Lys Val Thr Arg Ala Cys Lys Glu
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Glu Gln Ile Glu Asp Leu Lys Lys Glu Val Lys Arg Lys Leu Thr Ala
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Ala Ala Val Ala Asn Pro Ser Gln Leu Leu Asn Phe Ile Asp Ala Val
65 70 75 80

Gln Arg Leu Gly Val Ala Tyr His Phe Glu Gln Glu Ile Glu Glu Ala
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Leu Gln His Ile Cys Asn Ser Phe His Asp Cys Asn Asp Met Asp Gly
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Asp Leu Tyr Asn Ile Ala Leu Gly Phe Arg Leu Leu Arg Gln Gln Gly
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Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
    130                 135                 140

Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
145                 150                 155                 160

Tyr Glu Ala Ala His Leu Arg Val His Gly Glu Asp Ile Leu Ala Lys
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Ala Leu Ala Phe Thr Thr Thr His Leu Lys Ala Met Val Glu Ser Leu
            180                 185                 190

Gly Tyr His Leu Ala Glu Gln Val Ala His Ala Leu Asn Arg Pro Ile
        195                 200                 205

Arg Lys Gly Leu Glu Arg Leu Glu Ala Arg Trp Tyr Ile Ser Val Tyr
    210                 215                 220

Gln Asp Glu Ala Phe His Asp Lys Thr Leu Leu Glu Leu Ala Lys Leu
225                 230                 235                 240

Asp Phe Asn Leu Val Gln Ser Leu His Lys Glu Glu Leu Ser Asn Leu
                245                 250                 255

Ala Arg Trp Trp Lys Glu Leu Asp Phe Ala Thr Lys Leu Pro Phe Ala
            260                 265                 270

Arg Asp Arg Leu Val Glu Gly Tyr Phe Trp Met His Gly Val Tyr Phe
        275                 280                 285

Glu Pro Gln Tyr Leu Arg Gly Arg Arg Ile Leu Thr Lys Val Ile Ala
    290                 295                 300

Met Thr Ser Ile Leu Asp Asp Ile His Asp Ala Tyr Gly Thr Pro Glu
305                 310                 315                 320
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Glu Leu Lys Leu Phe Ile Glu Ala Ile Glu Arg Trp Asp Ile Asn Ser
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        355                 360                 365

Tyr Arg Val His Tyr Ala Lys Glu Val Met Lys Asn Gln Val Arg Ala
    370                 375                 380

Tyr Phe Ala Glu Ala Lys Trp Leu His Glu Glu His Val Pro Ala Phe
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Glu Glu Tyr Met Arg Val Ala Leu Ala Ser Ser Gly Tyr Cys Leu Leu
                405                 410                 415

Ala Thr Thr Ser Phe Val Gly Met Gly Glu Ile Ala Thr Lys Glu Ala
            420                 425                 430

Phe Asp Trp Val Thr Ser Asp Pro Lys Ile Met Ser Ser Ser Asn Phe
        435                 440                 445

Ile Thr Arg Leu Met Asp Asp Ile Lys Ser His Lys Phe Glu Gln Lys
    450                 455                 460

Arg Gly His Val Thr Ser Ala Val Glu Cys Tyr Met Lys Gln Tyr Gly
465                 470                 475                 480

Val Ser Glu Glu Gln Val Tyr Ser Glu Phe Gln Lys Gln Ile Glu Asn
                485                 490                 495

Ala Trp Leu Asp Ile Asn Gln Glu Cys Leu Lys Pro Thr Ala Val Ser
            500                 505                 510

Met Pro Leu Leu Ala Arg Leu Leu Asn Phe Thr Arg Thr Met Asp Val
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ttccgtctgc tgcgccagca aggctacacg atttcctgtg acatctttaa taaattcacc 420

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Lys Asn Arg Pro Val Ala Asn Phe His Pro Asn Ile Trp Gly Asp Gln
20 25 30

Phe Ile Thr Tyr Thr Pro Glu Asp Lys Val Thr Arg Ala Cys Lys Glu
35 40 45

Glu Gln Ile Glu Asp Leu Lys Lys Glu Val Lys Arg Lys Leu Thr Ala
50 55 60

Ala Ala Val Ala Asn Pro Ser Gln Leu Leu Asn Phe Ile Asp Ala Val
65 70 75 80

Gln Arg Leu Gly Val Ala Tyr His Phe Glu Gln Glu Ile Glu Glu Ala
85 90 95

Leu Gln His Ile Cys Asn Ser Phe His Asp Cys Asn Asp Met Asp Gly
100 105 110

Asp Leu Tyr Asn Ile Ala Leu Gly Phe Arg Leu Leu Arg Gln Gln Gly

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        115                 120                 125

Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
    130                 135                 140

Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
145                 150                 155                 160

Tyr Glu Ala Ala His Leu Arg Val His Gly Glu Asp Ile Leu Ala Lys
                165                 170                 175

Ala Leu Ala Phe Thr Thr Thr His Leu Lys Ala Met Val Glu Ser Leu
            180                 185                 190

Gly Tyr His Leu Ala Glu Gln Val Ala His Ala Leu Asn Arg Pro Ile
        195                 200                 205

Arg Lys Gly Leu Glu Arg Leu Glu Ala Arg Trp Tyr Ile Ser Val Tyr
    210                 215                 220

Gln Asp Glu Ala Phe His Asp Lys Thr Leu Leu Glu Leu Ala Lys Leu
225                 230                 235                 240

Asp Phe Asn Leu Val Gln Ser Leu His Lys Glu Glu Leu Ser Asn Leu
                245                 250                 255

Ala Arg Trp Trp Lys Glu Leu Asp Phe Ala Thr Lys Leu Pro Phe Ala
            260                 265                 270

Arg Asp Arg Leu Val Glu Gly Tyr Phe Trp Met His Gly Val Tyr Phe
        275                 280                 285

Glu Pro Gln Tyr Leu Arg Gly Arg Arg Ile Leu Thr Lys Val Ile Ala
    290                 295                 300

Met Thr Ser Ile Leu Asp Asp Ile His Asp Ala Tyr Gly Ser Pro Glu
305                 310                 315                 320

Glu Leu Lys Leu Phe Ile Glu Ala Ile Glu Lys Trp Asp Glu Ser Ser
                325                 330                 335
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Ile Asn Gln Leu Pro Glu Tyr Met Lys Leu Cys Phe Val Ala Leu Ile
            340                 345                 350

Asp Val Tyr Asn Glu Ile Glu Glu Glu Met Glu Lys Glu Gly Asn Gln
        355                 360                 365

Tyr Arg Ile His Tyr Leu Lys Glu Val Met Lys Asn Gln Val Arg Ala
    370                 375                 380

Tyr Phe Ala Glu Ala Lys Trp Leu His Asp Glu His Val Pro Ala Phe
385                 390                 395                 400

Glu Glu Tyr Met Arg Val Ala Leu Ala Ser Ser Gly Tyr Cys Leu Leu
                405                 410                 415

Ala Val Thr Ser Phe Val Gly Met Gly Glu Ile Val Thr Lys Glu Ala
            420                 425                 430

Phe Asp Trp Val Thr Ser Asp Pro Lys Leu Met Ser Ser Ser Asn Phe
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Ile Thr Arg Leu Met Asp Asp Ile Lys Ser His Lys Phe Glu Gln Lys
    450                 455                 460

Arg Gly His Val Thr Ser Ala Val Glu Cys Tyr Met Lys Gln Tyr Gly
465                 470                 475                 480

Val Thr Glu Glu Gln Val Tyr Ser Glu Phe Lys Lys Gln Ile Glu Asn
                485                 490                 495

Ala Trp Leu Asp Ile Asn Gln Glu Cys Leu Lys Pro Thr Ala Val Pro
            500                 505                 510

Met Pro Leu Leu Ala Arg Leu Leu Asn Phe Thr Arg Thr Met Asp Val
        515                 520                 525

Ile Tyr Lys Glu Gln Asp Ser Tyr Thr His Val Gly Lys Val Met Arg
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Asp Asn Ile Ala Ser Val Phe Ile Asn Pro Val Ile
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545 550 555

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<213> Artificial Sequence

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aaagtgacaa gggcctgcaa agaggagcag atcgaggacc tgaaaaaaga ggtgaagcgc 180

aagctgaccg cagccgcagt ggcaaacccg agccaactgt taaacttcat cgatgccgtg 240

cagcgcctgg gcgttgccta tcacttcgag caggaaatcg aagaagccct acagcacatc 300

tgtaacagct tccacgattg taacgacatg gatggcgact tatacaacat agcattaggt 360

ttccgcttac tgcgtcagca gggctacacc ataagctgcg acatctttaa caagtttacc 420

gacgagcgcg gtcgttttaa agaggcgctg attagcgacg ttcgcggcat gttaggtctg 480

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gcccatgcac tgaatcgccc gattcgtaag ggcctggaac gcctggaagc ccgctggtac 660

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gagatggaga aagaggggaa ccagtaccgc atccactacc tgaaagaggt gatgaagaat 1140

caggtgcgcg catacttcgc agaggccaaa tggctgcatg atgagcatgt tcctgccttc 1200

gaggagtaca tgcgcgtggc attagccagc agtggttact gtctgttagc cgttacgagc 1260

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atcaaccaag agtgcctgaa accgaccgca gtgccgatgc ctctgttagc ccgtctgctg 1560

aatttcacac gcacgatgga cgttatctac aaggagcagg atagctacac ccacgttggt 1620

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Lys Asn Arg Pro Val Ala Asn Phe His Pro Asn Ile Trp Gly Asp Gln
20 25 30

Phe Ile Thr Tyr Thr Pro Glu Asp Lys Val Thr Arg Ala Cys Lys Glu
35 40 45

Glu Gln Ile Glu Asp Leu Lys Lys Glu Val Lys Arg Lys Leu Thr Ala
50 55 60

Ala Ala Val Ala Asn Pro Ser Gln Leu Leu Asn Phe Ile Asp Ala Val
65 70 75 80

Gln Arg Leu Gly Val Ala Tyr His Phe Glu Gln Glu Ile Glu Glu Ala
85 90 95

Leu Gln His Ile Cys Asn Ser Phe His Asp Cys Asn Asp Met Asp Gly
100 105 110

Asp Leu Tyr Asn Ile Ala Leu Gly Phe Arg Leu Leu Arg Gln Gln Gly

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        115                 120                 125

Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
    130                 135                 140

Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
145                 150                 155                 160

Tyr Glu Ala Ala His Leu Arg Val His Gly Glu Asp Ile Leu Ala Lys
                165                 170                 175

Ala Leu Ala Phe Thr Thr Thr His Leu Lys Ala Met Val Glu Ser Leu
            180                 185                 190

Gly Tyr His Leu Ala Glu Gln Val Ala His Ala Leu Asn Arg Pro Ile
        195                 200                 205

Arg Lys Gly Leu Glu Arg Leu Glu Ala Arg Trp Tyr Ile Ser Val Tyr
    210                 215                 220

Gln Asp Glu Ala Phe His Asp Lys Thr Leu Leu Glu Leu Ala Lys Leu
225                 230                 235                 240

Asp Phe Asn Leu Val Gln Ser Leu His Lys Glu Glu Leu Ser Asn Leu
                245                 250                 255

Ala Arg Trp Trp Lys Glu Leu Asp Phe Ala Thr Lys Leu Pro Phe Ala
            260                 265                 270

Arg Asp Arg Leu Val Glu Gly Tyr Phe Trp Met His Gly Val Tyr Phe
        275                 280                 285

Glu Pro Gln Tyr Leu Arg Gly Arg Arg Ile Leu Thr Lys Val Ile Ala
    290                 295                 300

Leu Thr Ser Ile Leu Asp Asp Ile His Asp Ala Tyr Gly Thr Pro Glu
305                 310                 315                 320

Glu Leu Lys Leu Phe Ile Glu Ala Ile Glu Lys Trp Asp Glu Ser Ser
                325                 330                 335
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Ile Asn Gln Leu Pro Glu Tyr Met Lys Leu Cys Tyr Val Ala Leu Leu
            340                 345                 350

Asp Val Tyr Asn Glu Ile Glu Glu Glu Met Glu Lys Glu Gly Asn Gln
        355                 360                 365

Tyr Arg Ile His Tyr Leu Lys Glu Val Met Lys Asn Gln Val Arg Ala
    370                 375                 380

Tyr Phe Ala Glu Ala Lys Trp Leu His Asp Glu His Val Pro Ala Phe
385                 390                 395                 400

Glu Glu Tyr Met Arg Val Ala Leu Ala Ser Ser Gly Tyr Cys Leu Leu
                405                 410                 415

Ala Val Thr Ser Phe Val Gly Met Gly Glu Ile Val Thr Lys Glu Ala
            420                 425                 430

Phe Asp Trp Val Thr Ser Asp Pro Arg Ile Met Ser Ser Ser Asn Phe
        435                 440                 445

Ile Thr Arg Leu Met Asp Asp Ile Lys Ser His Lys Phe Glu Gln Lys
    450                 455                 460

Arg Gly His Val Thr Ser Ala Val Glu Cys Tyr Met Lys Gln Tyr Ala
465                 470                 475                 480

Val Thr Glu Glu Gln Val Tyr Ser Glu Phe Lys Lys Gln Ile Glu Asn
                485                 490                 495

Ala Trp Leu Asp Ile Asn Gln Glu Cys Leu Lys Pro Thr Ala Val Pro
            500                 505                 510

Met Pro Leu Leu Ala Arg Leu Leu Asn Phe Thr Arg Thr Met Asp Val
        515                 520                 525

Ile Tyr Lys Glu Gln Asp Ser Tyr Thr His Val Gly Lys Thr Met Arg
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Asp Asn Ile Ala Ser Val Phe Ile Asn Pro Val Ile
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aaagtgacaa gggcctgcaa agaggagcag atcgaggacc tgaaaaaaga ggtgaagcgc 180

aagctgaccg cagccgcagt ggcaaacccg agccaactgt taaacttcat cgatgccgtg 240

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tgtaacagct tccacgattg taacgacatg gatggcgact tatacaacat agcattaggt 360

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gcccatgcac tgaatcgccc gattcgtaag ggcctggaac gcctggaagc ccgctggtac 660

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gaggagtaca tgcgcgtggc attagccagc agtggttact gtctgttagc cgttacgagc 1260

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Lys Asn Arg Pro Val Ala Asn Phe His Pro Asn Ile Trp Gly Asp Gln
20 25 30

Phe Ile Thr Tyr Thr Pro Glu Asp Lys Val Thr Arg Ala Lys Lys Glu
35 40 45

Glu Gln Ile Glu Asp Leu Lys Lys Glu Val Lys Arg Lys Leu Thr Ala
50 55 60

Ala Ala Val Ala Asn Pro Ser Gln Leu Leu Asn Phe Ile Asp Ala Val
65 70 75 80

Gln Arg Leu Gly Val Ala Tyr His Phe Glu Gln Glu Ile Glu Glu Ala
85 90 95

Leu Gln His Ile Cys Asn Ser Phe His Asp Cys Asn Asp Met Asp Gly
100 105 110

Asp Leu Tyr Asn Ile Ala Leu Gly Phe Arg Leu Leu Arg Gln Gln Gly

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        115                 120                 125

Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
    130                 135                 140

Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
145                 150                 155                 160

Tyr Glu Ala Ala His Leu Arg Val His Gly Glu Asp Ile Leu Ala Lys
                165                 170                 175

Ala Leu Ala Phe Thr Thr Thr His Leu Lys Ala Met Val Glu Ser Leu
            180                 185                 190

Gly Tyr His Leu Ala Glu Gln Val Ala His Ala Leu Asn Arg Pro Ile
        195                 200                 205

Arg Lys Gly Leu Glu Arg Leu Glu Ala Arg Trp Tyr Ile Ser Val Tyr
    210                 215                 220

Gln Asp Glu Ala Phe His Asp Lys Thr Leu Leu Glu Leu Ala Lys Leu
225                 230                 235                 240

Asp Phe Asn Leu Val Gln Ser Leu His Lys Glu Glu Leu Ser Asn Leu
                245                 250                 255

Ala Arg Trp Trp Lys Glu Leu Asp Phe Ala Thr Lys Leu Pro Phe Ala
            260                 265                 270

Arg Asp Arg Leu Val Glu Gly Tyr Phe Trp Met Met Gly Val Tyr Phe
        275                 280                 285

Glu Pro Gln Tyr Leu Arg Gly Arg Arg Ile Leu Thr Lys Val Ile Ala
    290                 295                 300

Met Thr Ser Ile Leu Asp Asp Ile His Asp Ala Tyr Gly Ser Pro Glu
305                 310                 315                 320

Glu Leu Lys Leu Phe Ile Glu Ala Ile Glu Lys Trp Asp Glu Ser Ser
                325                 330                 335
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Ile Asn Gln Leu Pro Glu Tyr Met Lys Leu Cys Phe Val Ala Leu Ile
            340                 345                 350

Asp Val Tyr Asn Glu Ile Glu Glu Glu Met Glu Lys Glu Gly Asn Gln
        355                 360                 365

Tyr Arg Ile His Tyr Leu Lys Glu Val Met Lys Asn Gln Val Arg Ala
    370                 375                 380

Tyr Phe Ala Glu Ala Lys Trp Leu His Asp Glu His Val Pro Ala Phe
385                 390                 395                 400

Glu Glu Tyr Met Arg Val Ala Leu Ala Ser Ser Gly Tyr Cys Leu Leu
                405                 410                 415

Ala Val Thr Ser Phe Val Gly Met Gly Glu Ile Val Thr Lys Glu Ala
            420                 425                 430

Phe Asp Trp Val Thr Ser Asp Pro Lys Leu Met Ser Ser Ser Asn Thr
        435                 440                 445

Ile Thr Arg Leu Met Asp Asp Ile Lys Ser His Lys Phe Glu Gln Lys
    450                 455                 460

Arg Gly His Val Thr Ser Ala Val Glu Cys Tyr Met Lys Gln Tyr Gly
465                 470                 475                 480

Val Thr Glu Glu Gln Val Tyr Ser Glu Phe Lys Lys Gln Ile Glu Asn
                485                 490                 495

Ala Trp Leu Asp Ile Asn Gln Glu Cys Leu Lys Pro Thr Ala Val Pro
            500                 505                 510

Met Pro Leu Leu Ala Arg Leu Leu Asn Phe Thr Arg Thr Met Asp Val
        515                 520                 525

Ile Tyr Lys Glu Glu Asp Ser Tyr Thr His Val Gly Lys Val Met Arg
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Asp Asn Ile Ala Ser Val Phe Ile Asn Pro Val Ile
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aaagtgacaa gggccaaaaa agaggagcag atcgaggacc tgaaaaaaga ggtgaagcgc 180

aagctgaccg cagccgcagt ggcaaacccg agccaactgt taaacttcat cgatgccgtg 240

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tgtaacagct tccacgattg taacgacatg gatggcgact tatacaacat agcattaggt 360

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tacgaagccg cacatctgcg cgtgcacggc gaagacattc tggcgaaggc gctggcattc 540

acaaccacac acctgaaggc aatggtggaa agtctgggct accacttagc cgagcaggtt 600

gcccatgcac tgaatcgccc gattcgtaag ggcctggaac gcctggaagc ccgctggtac 660

atcagtgttt atcaggatga agcctttcat gataagaccc tgctggagct ggcaaagctg 720

gatttcaacc tggttcagag cctgcataag gaagagctga gcaacctggc ccgttggtgg 780

aaggagctgg atttcgcaac caagctgccg ttcgccaggg acaggttagt tgaaggctac 840

ttctggatga tgggcgttta cttcgagccg caatacctgc gtggccgccg catcctgacg 900

aaggtgatcg ccatgaccag cattctggac gacatccacg atgcgtacgg gagccctgag 960

gagttaaagc tgttcatcga ggcaatcgag aagtgggatg agagtagcat caaccaactg 1020

ccggagtata tgaaactgtg cttcgtggcc ctgattgatg tttacaatga gattgaagag 1080

gagatggaga aagaggggaa ccagtaccgc atccactacc tgaaagaggt gatgaagaat 1140

caggtgcgcg catacttcgc agaggccaaa tggctgcatg atgagcatgt tcctgccttc 1200

gaggagtaca tgcgcgtggc attagccagc agtggttact gtctgttagc cgttacgagc 1260

ttcgtgggta tgggcgagat cgtgaccaaa gaggcattcg actgggtgac gagcgacccg 1320

aagctgatga gcagcagcaa caccatcacc cgtctgatgg acgacatcaa gagccacaag 1380

ttcgagcaga aacgcggtca cgttaccagc gccgtggagt gctacatgaa gcagtacggc 1440

gtgacagagg agcaagtgta cagcgagttc aagaaacaaa tcgagaacgc ctggctggac 1500

atcaaccaag agtgcctgaa accgaccgca gtgccgatgc ctctgttagc ccgtctgctg 1560

aatttcacac gcacgatgga cgttatctac aaggaggaag atagctacac ccacgttggt 1620

aaggtgatgc gcgacaacat cgccagtgtg ttcatcaacc cggtgatcta a 1671

<210> 9
<211> 556
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene synthase

<400> 9

Met Ala Thr Gln Val Ser Ala Ser Ser Leu Ala Gln Ile Pro Gln Pro
1 5 10 15

Lys Asn Arg Pro Val Ala Asn Phe His Pro Asn Ile Trp Gly Asp Gln
20 25 30

Phe Ile Thr Tyr Thr Pro Glu Asp Lys Val Thr Arg Ala Lys Lys Glu
35 40 45

Glu Gln Ile Glu Asp Leu Lys Lys Glu Val Lys Arg Lys Leu Thr Ala
50 55 60

Ala Ala Val Ala Asn Pro Ser Gln Leu Leu Asn Phe Ile Asp Ala Val
65 70 75 80

Gln Arg Leu Gly Val Ala Tyr His Phe Glu Gln Glu Ile Glu Glu Ala
85 90 95

Leu Gln His Ile Cys Asn Ser Phe His Asp Cys Asn Asp Met Asp Gly
100 105 110

Asp Leu Tyr Asn Ile Ala Leu Gly Phe Arg Leu Leu Arg Gln Gln Gly

```
        115                 120                 125

Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
    130                 135                 140

Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
145                 150                 155                 160

Tyr Glu Ala Ala His Leu Arg Val His Gly Glu Asp Ile Leu Ala Lys
                165                 170                 175

Ala Leu Ala Phe Thr Thr Thr His Leu Lys Ala Met Val Glu Ser Leu
            180                 185                 190

Gly Tyr His Leu Ala Glu Gln Val Ala His Ala Leu Asn Arg Pro Ile
        195                 200                 205

Arg Lys Gly Leu Glu Arg Leu Glu Ala Arg Trp Tyr Ile Ser Val Tyr
    210                 215                 220

Gln Asp Glu Ala Phe His Asp Lys Thr Leu Leu Glu Leu Ala Lys Leu
225                 230                 235                 240

Asp Phe Asn Leu Val Gln Ser Leu His Lys Glu Glu Leu Ser Asn Leu
                245                 250                 255

Ala Arg Trp Trp Lys Glu Leu Asp Phe Ala Thr Lys Leu Pro Phe Ala
            260                 265                 270

Arg Asp Arg Leu Val Glu Gly Tyr Phe Trp Met Met Gly Val Tyr Phe
        275                 280                 285

Glu Pro Gln Tyr Leu Arg Gly Arg Arg Ile Leu Thr Lys Val Ile Ala
    290                 295                 300

Leu Thr Ser Ile Leu Asp Asp Ile His Asp Ala Tyr Gly Thr Pro Glu
305                 310                 315                 320

Glu Leu Lys Leu Phe Ile Glu Ala Ile Glu Lys Trp Asp Glu Ser Ser
                325                 330                 335
```

```
Ile Asn Gln Leu Pro Glu Tyr Met Lys Leu Cys Tyr Val Ala Leu Leu
            340                 345                 350

Asp Val Tyr Asn Glu Ile Glu Glu Glu Met Glu Lys Glu Gly Asn Gln
        355                 360                 365

Tyr Arg Ile His Tyr Leu Lys Glu Val Met Lys Asn Gln Val Arg Ala
    370                 375                 380

Tyr Phe Ala Glu Ala Lys Trp Leu His Asp Glu His Val Pro Ala Phe
385                 390                 395                 400

Glu Glu Tyr Met Arg Val Ala Leu Ala Ser Ser Gly Tyr Cys Leu Leu
                405                 410                 415

Ala Val Thr Ser Phe Val Gly Met Gly Glu Ile Val Thr Lys Glu Ala
            420                 425                 430

Phe Asp Trp Val Thr Ser Asp Pro Arg Ile Met Ser Ser Ser Asn Thr
        435                 440                 445

Ile Thr Arg Leu Met Asp Asp Ile Lys Ser His Lys Phe Glu Gln Lys
    450                 455                 460

Arg Gly His Val Thr Ser Ala Val Glu Cys Tyr Met Lys Gln Tyr Ala
465                 470                 475                 480

Val Thr Glu Glu Gln Val Tyr Ser Glu Phe Lys Lys Gln Ile Glu Asn
                485                 490                 495

Ala Trp Leu Asp Ile Asn Gln Glu Cys Leu Lys Pro Thr Ala Val Pro
            500                 505                 510

Met Pro Leu Leu Ala Arg Leu Leu Asn Phe Thr Arg Thr Met Asp Val
        515                 520                 525

Ile Tyr Lys Glu Glu Asp Ser Tyr Thr His Val Gly Lys Thr Met Arg
    530                 535                 540

Asp Asn Ile Ala Ser Val Phe Ile Asn Pro Val Ile
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545 550 555

<210> 10
<211> 1671
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene synthase

<400> 10
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gttgcaaact tccaccctaa tatctggggc gatcagttca tcacctatac cccggaagat 120

aaagtgacaa gggccaaaaa agaggagcag atcgaggacc tgaaaaaaga ggtgaagcgc 180

aagctgaccg cagccgcagt ggcaaacccg agccaactgt taaacttcat cgatgccgtg 240

cagcgcctgg gcgttgccta tcacttcgag caggaaatcg aagaagccct acagcacatc 300

tgtaacagct tccacgattg taacgacatg gatggcgact tatacaacat agcattaggt 360

ttccgcttac tgcgtcagca gggctacacc ataagctgcg acatctttaa caagtttacc 420

gacgagcgcg gtcgttttaa agaggcgctg attagcgacg ttcgcggcat gttaggtctg 480

tacgaagccg cacatctgcg cgtgcacggc gaagacattc tggcgaaggc gctggcattc 540

acaaccacac acctgaaggc aatggtggaa agtctgggct accacttagc cgagcaggtt 600

gcccatgcac tgaatcgccc gattcgtaag ggcctggaac gcctggaagc ccgctggtac 660

atcagtgttt atcaggatga agcctttcat gataagaccc tgctggagct ggcaaagctg 720

gatttcaacc tggttcagag cctgcataag gaagagctga gcaacctggc ccgttggtgg 780

aaggagctgg atttcgcaac caagctgccg ttcgccaggg acaggttagt tgaaggctac 840

ttctggatga tgggcgttta cttcgagccg caatacctgc gtggccgccg catcctgacg 900

aaggtgatcg ccctgaccag cattctggac gacatccacg atgcgtacgg gacccctgag 960

gagttaaagc tgttcatcga ggcaatcgag aagtgggatg agagtagcat caaccaactg 1020

ccggagtata tgaaactgtg ctatgtggcc ctgctggatg tttacaatga gattgaagag 1080

gagatggaga aagaggggaa ccagtaccgc atccactacc tgaaagaggt gatgaagaat 1140

caggtgcgcg catacttcgc agaggccaaa tggctgcatg atgagcatgt tcctgccttc 1200

gaggagtaca tgcgcgtggc attagccagc agtggttact gtctgttagc cgttacgagc 1260

ttcgtgggta tgggcgagat cgtgaccaaa gaggcattcg actgggtgac gagcgacccg 1320

cgtattatga gcagcagcaa caccatcacc cgtctgatgg acgacatcaa gagccacaag 1380

ttcgagcaga aacgcggtca cgttaccagc gccgtggagt gctacatgaa gcagtacgca 1440

gtgacagagg agcaagtgta cagcgagttc aagaaacaaa tcgagaacgc ctggctggac 1500

atcaaccaag agtgcctgaa accgaccgca gtgccgatgc ctctgttagc ccgtctgctg 1560

aatttcacac gcacgatgga cgttatctac aaggaggaag atagctacac ccacgttggt 1620

aagaccatgc gcgacaacat cgccagtgtg ttcatcaacc cggtgatcta a 1671

<210> 11
<211> 556
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene synthase

<400> 11

Met Ala Thr Gln Val Ser Ala Ser Ser Leu Ala Gln Ile Pro Gln Pro
1 5 10 15

Lys Asn Arg Pro Val Ala Asn Phe His Pro Asn Ile Trp Gly Asp Gln
20 25 30

Phe Ile Thr Tyr Thr Pro Glu Asp Lys Val Thr Arg Ala Lys Lys Glu
35 40 45

Glu Gln Ile Glu Asp Leu Lys Lys Glu Val Lys Arg Lys Leu Thr Ala
50 55 60

Ala Ala Val Ala Asn Pro Ser Gln Leu Leu Asn Phe Ile Asp Ala Val
65 70 75 80

Gln Arg Leu Gly Val Ala Tyr His Phe Glu Gln Glu Ile Glu Glu Ala
85 90 95

Leu Gln His Ile Cys Asn Ser Phe His Asp Cys Asn Asp Met Asp Gly
100 105 110

Asp Leu Tyr Asn Ile Ala Leu Gly Phe Arg Leu Leu Arg Gln Gln Gly

```
        115                 120                 125

Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
    130                 135                 140

Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
145                 150                 155                 160

Tyr Glu Ala Ala His Leu Arg Val His Gly Glu Asp Ile Leu Ala Lys
                165                 170                 175

Ala Leu Ala Phe Thr Thr Thr His Leu Lys Ala Met Val Glu Ser Leu
            180                 185                 190

Gly Tyr His Leu Ala Glu Gln Val Ala His Ala Leu Asn Arg Pro Ile
        195                 200                 205

Arg Lys Gly Leu Glu Arg Leu Glu Ala Arg Trp Tyr Ile Ser Val Tyr
    210                 215                 220

Gln Asp Glu Ala Phe His Asp Lys Thr Leu Leu Glu Leu Ala Lys Leu
225                 230                 235                 240

Asp Phe Asn Leu Val Gln Ser Leu His Lys Glu Glu Leu Ser Asn Leu
                245                 250                 255

Ala Arg Trp Trp Lys Glu Leu Asp Phe Ala Thr Lys Leu Pro Phe Ala
            260                 265                 270

Arg Asp Arg Leu Val Glu Gly Tyr Phe Trp Met Met Gly Val Tyr Phe
        275                 280                 285

Glu Pro Gln Tyr Leu Arg Gly Arg Arg Ile Leu Thr Lys Val Ile Ala
    290                 295                 300

Leu Thr Ser Ile Leu Asp Asp Ile His Asp Ala Tyr Gly Thr Pro Glu
305                 310                 315                 320

Glu Leu Lys Leu Phe Ile Glu Ala Ile Glu Lys Trp Asp Glu Ser Ser
                325                 330                 335
```

```
Ile Asn Gln Leu Pro Glu Tyr Met Lys Leu Cys Tyr Val Ala Leu Leu
            340                 345                 350

Asp Val Tyr Asn Glu Ile Glu Glu Glu Met Glu Lys Glu Gly Asn Gln
        355                 360                 365

Tyr Arg Ile His Tyr Leu Lys Glu Val Met Lys Asn Gln Val Arg Ala
    370                 375                 380

Tyr Phe Ala Glu Ala Lys Trp Leu His Asp Glu His Val Pro Ala Phe
385                 390                 395                 400

Glu Glu Tyr Met Arg Val Ala Leu Ala Ser Ser Gly Tyr Cys Leu Leu
                405                 410                 415

Ala Val Thr Ser Phe Val Gly Met Gly Glu Ile Val Thr Lys Glu Ala
            420                 425                 430

Phe Asp Trp Val Thr Ser Asp Pro Arg Ile Met Ser Ser Ser Asn Thr
        435                 440                 445

Ile Thr Arg Leu Met Asp Asp Ile Lys Ser His Lys Phe Glu Gln Lys
    450                 455                 460

Arg Gly His Val Thr Ser Ala Val Glu Cys Tyr Met Lys Gln Tyr Ala
465                 470                 475                 480

Val Thr Glu Glu Gln Val Tyr Ser Glu Phe Lys Lys Gln Ile Glu Asn
                485                 490                 495

Ala Trp Leu Asp Ile Asn Gln Glu Cys Leu Lys Pro Thr Ala Val Pro
            500                 505                 510

Met Pro Leu Leu Ala Arg Leu Leu Asn Phe Thr Arg Thr Met Asp Val
        515                 520                 525

Ile Tyr Lys Glu Glu Asp Ser Tyr Thr His Val Gly Lys Thr Met Arg
    530                 535                 540

Asp Asn Ile Ala Ser Val Phe Ile Asn Pro Val Ile
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545 550 555

<210> 12
<211> 548
<212> PRT
<213> Citrus sinensus

<400> 12

Met Ala Ser Gly Glu Thr Phe Arg Pro Thr Ala Asp Phe His Pro Ser
1 5 10 15

Leu Trp Arg Asn His Phe Leu Lys Gly Ala Ser Asp Phe Lys Thr Val
20 25 30

Asp His Thr Ala Thr Gln Glu Arg His Glu Ala Leu Lys Glu Glu Val
35 40 45

Arg Arg Met Ile Thr Asp Ala Glu Asp Lys Pro Val Gln Lys Leu Arg
50 55 60

Leu Ile Asp Glu Val Gln Arg Leu Gly Val Ala Tyr His Phe Glu Lys
65 70 75 80

Glu Ile Gly Asp Ala Ile Gln Lys Leu Cys Pro Ile Tyr Ile Asp Ser
85 90 95

Asn Arg Ala Asp Leu His Thr Val Ser Leu His Phe Arg Leu Leu Arg
100 105 110

Gln Gln Gly Ile Lys Ile Ser Cys Asp Val Phe Glu Lys Phe Lys Asp
115 120 125

Asp Glu Gly Arg Phe Lys Ser Ser Leu Ile Asn Asp Val Gln Gly Met
130 135 140

Leu Ser Leu Tyr Glu Ala Ala Tyr Met Ala Val Arg Gly Glu His Ile
145 150 155 160

Leu Asp Glu Ala Ile Ala Phe Thr Thr Thr His Leu Lys Ser Leu Val
165 170 175

```
Ala Gln Asp His Val Thr Pro Lys Leu Ala Glu Gln Ile Asn His Ala
            180                 185                 190

Leu Tyr Arg Pro Leu Arg Lys Thr Leu Pro Arg Leu Glu Ala Arg Tyr
        195                 200                 205

Phe Met Ser Met Ile Asn Ser Thr Ser Asp His Leu Cys Asn Lys Thr
    210                 215                 220

Leu Leu Asn Phe Ala Lys Leu Asp Phe Asn Ile Leu Leu Glu Leu His
225                 230                 235                 240

Lys Glu Glu Leu Asn Glu Leu Thr Lys Trp Trp Lys Asp Leu Asp Phe
                245                 250                 255

Thr Thr Lys Leu Pro Tyr Ala Arg Asp Arg Leu Val Glu Leu Tyr Phe
            260                 265                 270

Trp Asp Leu Gly Thr Tyr Phe Glu Pro Gln Tyr Ala Phe Gly Arg Lys
        275                 280                 285

Ile Met Thr Gln Leu Asn Tyr Ile Leu Ser Ile Ile Asp Asp Thr Tyr
    290                 295                 300

Asp Ala Tyr Gly Thr Leu Glu Glu Leu Ser Leu Phe Thr Glu Ala Val
305                 310                 315                 320

Gln Arg Trp Asn Ile Glu Ala Val Asp Met Leu Pro Glu Tyr Met Lys
                325                 330                 335

Leu Ile Tyr Arg Thr Leu Leu Asp Ala Phe Asn Glu Ile Glu Glu Asp
            340                 345                 350

Met Ala Lys Gln Gly Arg Ser His Cys Val Arg Tyr Ala Lys Glu Glu
        355                 360                 365

Asn Gln Lys Val Ile Gly Ala Tyr Ser Val Gln Ala Lys Trp Phe Ser
    370                 375                 380

Glu Gly Tyr Val Pro Thr Ile Glu Glu Tyr Met Pro Ile Ala Leu Thr
385                 390                 395                 400
```

```
Ser Cys Ala Tyr Thr Phe Val Ile Thr Asn Ser Phe Leu Gly Met Gly
                405                 410                 415


Asp Phe Ala Thr Lys Glu Val Phe Glu Trp Ile Ser Asn Asn Pro Lys
            420                 425                 430


Val Val Lys Ala Ala Ser Val Ile Cys Arg Leu Met Asp Asp Met Gln
        435                 440                 445


Gly His Glu Phe Glu Gln Lys Arg Gly His Val Ala Ser Ala Ile Glu
    450                 455                 460


Cys Tyr Thr Lys Gln His Gly Val Ser Lys Glu Glu Ala Ile Lys Met
465                 470                 475                 480


Phe Glu Glu Glu Val Ala Asn Ala Trp Lys Asp Ile Asn Glu Glu Leu
                485                 490                 495


Met Met Lys Pro Thr Val Val Ala Arg Pro Leu Leu Gly Thr Ile Leu
            500                 505                 510


Asn Leu Ala Arg Ala Ile Asp Phe Ile Tyr Lys Glu Asp Asp Gly Tyr
        515                 520                 525


Thr His Ser Tyr Leu Ile Lys Asp Gln Ile Ala Ser Val Leu Gly Asp
    530                 535                 540


His Val Pro Phe
545
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<210> 13
<211> 513
<212> PRT
<213> Zingiber zerumbet

<400> 13

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Met Glu Ala Ile Ser Leu Phe Ser Pro Phe Phe Phe Ile Thr Leu Phe
1               5                   10                  15


Leu Gly Phe Phe Ile Thr Leu Leu Ile Lys Arg Ser Ser Arg Ser Ser
```

```
            20                  25                  30

Val His Lys Gln Gln Val Leu Leu Ala Ser Leu Pro Pro Ser Pro Pro
        35                  40                  45

Arg Leu Pro Leu Ile Gly Asn Ile His Gln Leu Val Gly Gly Asn Pro
    50                  55                  60

His Arg Ile Leu Leu Gln Leu Ala Arg Thr His Gly Pro Leu Ile Cys
65                  70                  75                  80

Leu Arg Leu Gly Gln Val Asp Gln Val Val Ala Ser Ser Val Glu Ala
                85                  90                  95

Val Glu Glu Ile Ile Lys Arg His Asp Leu Lys Phe Ala Asp Arg Pro
            100                 105                 110

Arg Asp Leu Thr Phe Ser Arg Ile Phe Phe Tyr Asp Gly Asn Ala Val
        115                 120                 125

Val Met Thr Pro Tyr Gly Gly Glu Trp Lys Gln Met Arg Lys Ile Tyr
    130                 135                 140

Ala Met Glu Leu Leu Asn Ser Arg Arg Val Lys Ser Phe Ala Ala Ile
145                 150                 155                 160

Arg Glu Asp Val Ala Arg Lys Leu Thr Gly Glu Ile Ala His Lys Ala
                165                 170                 175

Phe Ala Gln Thr Pro Val Ile Asn Leu Ser Glu Met Val Met Ser Met
            180                 185                 190

Ile Asn Ala Ile Val Ile Arg Val Ala Phe Gly Asp Lys Cys Lys Gln
        195                 200                 205

Gln Ala Tyr Phe Leu His Leu Val Lys Glu Ala Met Ser Tyr Val Ser
    210                 215                 220

Ser Phe Ser Val Ala Asp Met Tyr Pro Ser Leu Lys Phe Leu Asp Thr
225                 230                 235                 240
```

```
Leu Thr Gly Leu Lys Ser Lys Leu Glu Gly Val His Gly Lys Leu Asp
                245                 250                 255

Lys Val Phe Asp Glu Ile Ile Ala Gln Arg Gln Ala Ala Leu Ala Ala
            260                 265                 270

Glu Gln Ala Glu Glu Asp Leu Ile Ile Asp Val Leu Leu Lys Leu Lys
        275                 280                 285

Asp Glu Gly Asn Gln Glu Phe Pro Ile Thr Tyr Thr Ser Val Lys Ala
    290                 295                 300

Ile Val Met Glu Ile Phe Leu Ala Gly Thr Glu Thr Ser Ser Ser Val
305                 310                 315                 320

Ile Asp Trp Val Met Ser Glu Leu Ile Lys Asn Pro Lys Ala Met Glu
                325                 330                 335

Lys Val Gln Lys Glu Met Arg Glu Ala Met Gln Gly Lys Thr Lys Leu
            340                 345                 350

Glu Glu Ser Asp Ile Pro Lys Phe Ser Tyr Leu Asn Leu Val Ile Lys
        355                 360                 365

Glu Thr Leu Arg Leu His Pro Pro Gly Pro Leu Leu Phe Pro Arg Glu
    370                 375                 380

Cys Arg Glu Thr Cys Glu Val Met Gly Tyr Arg Val Pro Ala Gly Ala
385                 390                 395                 400

Arg Leu Leu Ile Asn Ala Phe Ala Leu Ser Arg Asp Glu Lys Tyr Trp
                405                 410                 415

Gly Ser Asp Ala Glu Ser Phe Lys Pro Glu Arg Phe Glu Gly Ile Ser
            420                 425                 430

Val Asp Phe Lys Gly Ser Asn Phe Glu Phe Met Pro Phe Gly Ala Gly
        435                 440                 445

Arg Arg Ile Cys Pro Gly Met Thr Phe Gly Ile Ser Ser Val Glu Val
```

```
    450                 455                 460

Ala Leu Ala His Leu Leu Phe His Phe Asp Trp Gln Leu Pro Gln Gly
465                 470                 475                 480

Met Lys Ile Glu Asp Leu Asp Met Met Glu Val Ser Gly Met Ser Ala
                485                 490                 495

Thr Arg Arg Ser Pro Leu Leu Val Leu Ala Lys Leu Ile Ile Pro Leu
            500                 505                 510

Pro
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<210> 14
<211> 512
<212> PRT
<213> Zingiber zerumbet

<400> 14

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Met Ala Leu Leu Leu Ala Val Phe Phe Phe Phe Ile Thr Leu Phe Leu
1               5                   10                  15

Gly Phe Phe Ile Thr Leu Leu Ile Lys Arg Ser Ser Arg Ser Ser Val
            20                  25                  30

His Lys Gln Gln Val Leu Leu Ala Ser Leu Pro Pro Ser Pro Pro Arg
        35                  40                  45

Leu Pro Leu Ile Gly Asn Ile His Gln Leu Val Gly Gly Asn Pro His
    50                  55                  60

Arg Ile Leu Leu Gln Leu Ala Arg Thr His Gly Pro Leu Ile Cys Leu
65                  70                  75                  80

Arg Leu Gly Gln Val Asp Gln Val Val Ala Ser Ser Val Glu Ala Val
                85                  90                  95

Glu Glu Ile Ile Lys Arg His Asp Leu Lys Phe Ala Asp Arg Pro Arg
            100                 105                 110
```

```
Asp Leu Thr Phe Ser Arg Ile Phe Phe Tyr Asp Gly Asn Ala Val Val
        115                 120                 125

Met Thr Pro Tyr Gly Gly Glu Trp Lys Gln Met Arg Lys Ile Tyr Ala
    130                 135                 140

Met Glu Leu Leu Asn Ser Arg Arg Val Lys Ser Phe Ala Ala Ile Arg
145                 150                 155                 160

Glu Asp Val Ala Arg Lys Leu Thr Gly Glu Ile Ala His Lys Ala Phe
                165                 170                 175

Ala Gln Thr Pro Val Ile Asn Leu Ser Glu Met Val Met Ser Met Ile
            180                 185                 190

Asn Ala Ile Val Ile Arg Val Ala Phe Gly Asp Lys Cys Lys Gln Gln
        195                 200                 205

Ala Tyr Phe Leu His Leu Val Lys Glu Ala Met Ser Tyr Val Ser Ser
    210                 215                 220

Phe Ser Val Ala Asp Met Tyr Pro Ser Leu Lys Phe Leu Asp Thr Leu
225                 230                 235                 240

Thr Gly Leu Lys Ser Lys Leu Glu Gly Val His Gly Lys Leu Asp Lys
                245                 250                 255

Val Phe Asp Glu Ile Ile Ala Gln Arg Gln Ala Ala Leu Ala Ala Glu
            260                 265                 270

Gln Ala Glu Glu Asp Leu Ile Ile Asp Val Leu Leu Lys Leu Lys Asp
        275                 280                 285

Glu Gly Asn Gln Glu Phe Pro Ile Thr Tyr Thr Ser Val Lys Ala Ile
    290                 295                 300

Val Met Glu Ile Phe Leu Ala Gly Thr Glu Thr Ser Ser Ser Val Ile
305                 310                 315                 320

Asp Trp Val Met Ser Glu Leu Ile Lys Asn Pro Lys Ala Met Glu Lys
                325                 330                 335
```

Val Gln Lys Glu Met Arg Glu Ala Met Gln Gly Lys Thr Lys Leu Glu
340 345 350

Glu Ser Asp Ile Pro Lys Phe Ser Tyr Leu Asn Leu Val Ile Lys Glu
355 360 365

Thr Leu Arg Leu His Pro Pro Gly Pro Leu Leu Phe Pro Arg Glu Cys
370 375 380

Arg Glu Thr Cys Glu Val Met Gly Tyr Arg Val Pro Ala Gly Ala Arg
385 390 395 400

Leu Leu Ile Asn Ala Phe Ala Leu Ser Arg Asp Glu Lys Tyr Trp Gly
405 410 415

Ser Asp Ala Glu Ser Phe Lys Pro Glu Arg Phe Glu Gly Ile Ser Val
420 425 430

Asp Phe Lys Gly Ser Asn Phe Glu Phe Met Pro Phe Gly Ala Gly Arg
435 440 445

Arg Ile Cys Pro Gly Met Thr Phe Gly Ile Ser Ser Val Glu Val Ala
450 455 460

Leu Ala His Leu Leu Phe His Phe Asp Trp Gln Leu Pro Gln Gly Met
465 470 475 480

Lys Ile Glu Asp Leu Asp Met Met Glu Val Ser Gly Met Ser Ala Thr
485 490 495

Arg Arg Ser Pro Leu Leu Val Leu Ala Lys Leu Ile Ile Pro Leu Pro
500 505 510

<210> 15
<211> 1536
<212> DNA
<213> Zingiber zerumbet

<400> 15
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acgctgctga ttaaacgctc gtcccgtagc tctgtccata aacagcaagt gctgctggcc 120

tctctgccgc cgagtccgcc gcgcctgccg ctgattggca acatccatca actggtgggc 180

ggcaacccgc atcgtattct gctgcaactg gcgcgtaccc acggcccgct gatctgcctg 240

cgtctgggtc aggttgatca agtggttgca agttccgtgg aagctgttga agaaattatc 300

aaacgtcacg acctgaaatt tgcagatcgt ccgcgcgacc tgacctttag ccgtattttc 360

ttttatgatg gtaacgctgt cgtgatgacg ccgtacggcg gtgaatggaa acagatgcgt 420

aaaatctatg caatggaact gctgaacagc cgtcgtgtga aatcttttgc ggccattcgt 480

gaagacgttg cacgcaaact gaccggcgaa atcgctcaca aagcattcgc tcagacgccg 540

gtcattaacc tgtctgaaat ggtgatgagt atgatcaatg cgattgtcat ccgcgtggcc 600

tttggtgata aatgtaaaca gcaagcatac ttcctgcatc tggtgaaaga agctatgtcc 660

tatgtttcat cgttttcagt cgcggatatg tacccgtccc tgaaattcct ggacaccctg 720

acgggcctga aaagcaaact ggaaggcgtt cacggtaaac tggataaagt cttcgacgaa 780

atcatcgcac agcgtcaagc agcgctggcg gcggaacagg ctgaagaaga tctgattatc 840

gacgtgctgc tgaaactgaa agatgaaggc aaccaggaat ttccgattac ctatacgtca 900

gttaaagcga ttgtcatgga aatcttcctg gccggcaccg aaaccagcag cagcgtgatt 960

gactgggtta tgagtgaact gatcaaaaac ccgaaagcga tggaaaaagt gcagaaagaa 1020

atgcgtgaag ccatgcaagg caaaaccaaa ctggaagaat cggatattcc gaaatttagc 1080

tacctgaatc tggttatcaa agaaaccctg cgtctgcatc cgccgggtcc gctgctgttc 1140

ccgcgtgaat gccgcgaaac ctgcgaagtg atgggctatc gtgttccggc gggtgcccgc 1200

ctgctgatta acgcatttgc tctgtctcgt gatgaaaaat actggggttc cgacgccgaa 1260

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ctgctggttc tggccaaact gattatcccg ctgccg 1536

<210> 16
<211> 496
<212> PRT

<213> Barnadesia spinosa

<400> 16

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Met Glu Leu Thr Leu Thr Thr Ser Leu Gly Leu Ala Val Phe Val Phe
1               5                  10                  15


Ile Leu Phe Lys Leu Leu Thr Gly Ser Lys Ser Thr Lys Asn Ser Leu
            20                  25                  30


Pro Glu Ala Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Val
        35                  40                  45


Gly Thr Leu Pro His Arg Gly Val Thr Asp Met Ala Arg Lys Tyr Gly
    50                  55                  60


Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Thr Ile Val Val Ser
65                  70                  75                  80


Ser Pro Arg Trp Ala Lys Glu Val Leu Thr Thr Tyr Asp Ile Thr Phe
                85                  90                  95


Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Val Ala Tyr His Asn
            100                 105                 110


Thr Asp Ile Val Leu Ser Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125


Lys Leu Cys Thr Leu Glu Leu Leu Ser Ala Lys Lys Val Lys Ser Phe
    130                 135                 140


Gln Ser Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Lys Glu Val Arg
145                 150                 155                 160


Ser Ser Gly Ser Gly Ser Pro Val Asp Leu Ser Glu Ser Ile Phe Lys
                165                 170                 175


Leu Ile Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190


Asp Gln Arg Glu Phe Thr Glu Ile Val Lys Glu Ile Leu Arg Leu Thr
        195                 200                 205
```

```
Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Ile Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Ala Lys Leu Thr Asn Ile His Asn Lys Leu
225                 230                 235                 240

Asp Ser Leu Ile Asn Asn Ile Val Ser Glu His Pro Gly Ser Arg Thr
                245                 250                 255

Ser Ser Ser Gln Glu Ser Leu Leu Asp Val Leu Leu Arg Leu Lys Asp
            260                 265                 270

Ser Ala Glu Leu Pro Leu Thr Ser Asp Asn Val Lys Ala Val Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Ile Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320

Thr Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Arg Ile Gln Glu Glu
                325                 330                 335

Asp Ile Gln Glu Leu Ser Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Glu
        355                 360                 365

Pro Cys Val Leu Ala Gly Tyr Glu Ile Pro Thr Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Thr Phe Met Pro Glu Arg Phe Glu Asn Ser Pro Ile Asn Ile Met
                405                 410                 415
```

```
Gly Ser Glu Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ala Ala Leu Gly Leu Ala Asn Val Glu Leu Pro Leu Ala His
        435                 440                 445

Ile Leu Tyr Tyr Phe Asn Trp Lys Leu Pro Asn Gly Ala Arg Leu Asp
    450                 455                 460

Glu Leu Asp Met Ser Glu Cys Phe Gly Ala Thr Val Gln Arg Lys Ser
465                 470                 475                 480

Glu Leu Leu Leu Val Pro Thr Ala Tyr Lys Thr Ala Asn Asn Ser Ala
                485                 490                 495
```

<210> 17
<211> 496
<212> PRT
<213> Barnadesia spinosa

<400> 17

```
Met Ala Leu Leu Leu Ala Val Phe Leu Gly Leu Ala Val Phe Val Phe
1               5                   10                  15

Ile Leu Phe Lys Leu Leu Thr Gly Ser Lys Ser Thr Lys Asn Ser Leu
            20                  25                  30

Pro Glu Ala Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Val
        35                  40                  45

Gly Thr Leu Pro His Arg Gly Val Thr Asp Met Ala Arg Lys Tyr Gly
    50                  55                  60

Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Thr Ile Val Val Ser
65                  70                  75                  80

Ser Pro Arg Trp Ala Lys Glu Val Leu Thr Thr Tyr Asp Ile Thr Phe
                85                  90                  95

Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Val Ala Tyr His Asn
            100                 105                 110
```

```
Thr Asp Ile Val Leu Ser Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125

Lys Leu Cys Thr Leu Glu Leu Leu Ser Ala Lys Lys Val Lys Ser Phe
    130                 135                 140

Gln Ser Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Lys Glu Val Arg
145                 150                 155                 160

Ser Ser Gly Ser Gly Ser Pro Val Asp Leu Ser Glu Ser Ile Phe Lys
                165                 170                 175

Leu Ile Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190

Asp Gln Arg Glu Phe Thr Glu Ile Val Lys Glu Ile Leu Arg Leu Thr
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Ile Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Ala Lys Leu Thr Asn Ile His Asn Lys Leu
225                 230                 235                 240

Asp Ser Leu Ile Asn Asn Ile Val Ser Glu His Pro Gly Ser Arg Thr
                245                 250                 255

Ser Ser Ser Gln Glu Ser Leu Leu Asp Val Leu Leu Arg Leu Lys Asp
            260                 265                 270

Ser Ala Glu Leu Pro Leu Thr Ser Asp Asn Val Lys Ala Val Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Ile Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320

Thr Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Arg Ile Gln Glu Glu
```

```
                325                 330                 335

Asp Ile Gln Glu Leu Ser Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Glu
        355                 360                 365

Pro Cys Val Leu Ala Gly Tyr Glu Ile Pro Thr Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Thr Phe Met Pro Glu Arg Phe Glu Asn Ser Pro Ile Asn Ile Met
                405                 410                 415

Gly Ser Glu Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ala Ala Leu Gly Leu Ala Asn Val Glu Leu Pro Leu Ala His
        435                 440                 445

Ile Leu Tyr Tyr Phe Asn Trp Lys Leu Pro Asn Gly Ala Arg Leu Asp
    450                 455                 460

Glu Leu Asp Met Ser Glu Cys Phe Gly Ala Thr Val Gln Arg Lys Ser
465                 470                 475                 480

Glu Leu Leu Leu Val Pro Thr Ala Tyr Lys Thr Ala Asn Asn Ser Ala
                485                 490                 495
```

<210> 18
<211> 1488
<212> DNA
<213> Barnadesia spinosa

<400> 18
atggctctgt tattagcagt tttcctgggc ctggctgtct tcgtctttat cctgttcaaa 60

ctgctgaccg gctcaaaatc aaccaaaaat tcactgccgg aagcatggcg tctgccgatc 120

attggccaca tgcatcacct ggttggcacg ctgccgcatc gcggtgtgac cgacatggcg 180

cgtaaatacg gcagcctgat gcatctgcaa ctgggcgaag tgagcaccat tgtcgtctca 240

tcgccgcgtt gggcaaaaga agtgctgacg acgtatgata ttacctttgc gaatcgcccg 300

gaaaccctga ccggcgaaat tgttgcgtac cacaacacgg atattgtgct gtcaccgtat 360

ggcgaatact ggcgccaact gcgtaaactg tgcacgctgg aactgctgag cgccaaaaaa 420

gtgaaaagtt ttcagtcgct gcgtgaagaa gaatgctgga atctggtgaa agaagtgcgt 480

tcgagcggct caggttcccc ggtcgatctg tcggaatcca tctttaaact gattgcaacc 540

attctgagcc gcgcagcgtt tggcaaaggt atcaaagatc agcgtgaatt taccgaaatt 600

gtgaaagaaa tcctgcgcct gacgggcggt tttgatgtgg cggatatttt cccgtccaaa 660

aagatcctgc accacctgag cggcaaacgt gcgaaactga ccaacatcca caacaaactg 720

gattccctga ttaataacat tgtttctgaa catccgggtt cgcgtacctc gtcgagccag 780

gaaagcctgc tggatgtgct gctgcgcctg aaagattccg cggaactgcc gctgacctcg 840

gacaatgtta aagccgtgat cctggatatg ttcggtgcgg gcacggatac gtcgagcgcc 900

acgattgaat gggcgatcag cgaactgatc cgctgcccgc gtgcaatgga aaaagtgcaa 960

acggaactgc gtcaagcgct gaatggtaaa gaacgcattc aggaagaaga tattcaggaa 1020

ctgtcctatc tgaaactggt cattaaagaa accctgcgcc tgcatccgcc gctgccgctg 1080

gtgatgccgc gtgaatgtcg tgaaccgtgt gtcctggcgg gttacgaaat cccgaccaaa 1140

acgaaactga ttgtgaatgt ctttgccatc aatcgtgacc cggaatactg gaaagatgca 1200

gaaaccttca tgccggaacg ctttgaaaac agcccgatta acatcatggg tagtgaatat 1260

gaatacctgc cgtttggcgc aggccgccgt atgtgtccgg gtgcagctct gggtctggcg 1320

aatgtggaac tgccgctggc gcacatcctg tattatttta actggaaact gccgaatggc 1380

gctcgcctgg atgaactgga tatgtcggaa tgctttggcg cgacggtcca acgcaaaagc 1440

gaactgctgc tggtcccgac ggcatacaaa acggcaaaca actccgca 1488

<210> 19
<211> 502
<212> PRT
<213> Hyoscyamus muticus

<400> 19

Met Gln Phe Phe Ser Leu Val Ser Ile Phe Leu Phe Leu Ser Phe Leu

```
1               5                   10                  15

Phe Leu Leu Arg Lys Trp Lys Asn Ser Asn Ser Gln Ser Lys Lys Leu
            20                  25                  30

Pro Pro Gly Pro Trp Lys Leu Pro Leu Leu Gly Ser Met Leu His Met
        35                  40                  45

Val Gly Gly Leu Pro His His Val Leu Arg Asp Leu Ala Lys Lys Tyr
    50                  55                  60

Gly Pro Leu Met His Leu Gln Leu Gly Glu Val Ser Ala Val Val Val
65                  70                  75                  80

Thr Ser Pro Asp Met Ala Lys Glu Val Leu Lys Thr His Asp Ile Ala
                85                  90                  95

Phe Ala Ser Arg Pro Lys Leu Leu Ala Pro Glu Ile Val Cys Tyr Asn
            100                 105                 110

Arg Ser Asp Ile Ala Phe Cys Pro Tyr Gly Asp Tyr Trp Arg Gln Met
        115                 120                 125

Arg Lys Ile Cys Val Leu Glu Val Leu Ser Ala Lys Asn Val Arg Ser
    130                 135                 140

Phe Ser Ser Ile Arg Arg Asp Glu Val Leu Arg Leu Val Asn Phe Val
145                 150                 155                 160

Arg Ser Ser Thr Ser Glu Pro Val Asn Phe Thr Glu Arg Leu Phe Leu
                165                 170                 175

Phe Thr Ser Ser Met Thr Cys Arg Ser Ala Phe Gly Lys Val Phe Lys
            180                 185                 190

Glu Gln Glu Thr Phe Ile Gln Leu Ile Lys Glu Val Ile Gly Leu Ala
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Leu Lys Phe Leu His
    210                 215                 220
```

```
Val Leu Thr Gly Met Glu Gly Lys Ile Met Lys Ala His His Lys Val
225                 230                 235                 240

Asp Ala Ile Val Glu Asp Val Ile Asn Glu His Lys Lys Asn Leu Ala
                245                 250                 255

Met Gly Lys Thr Asn Gly Ala Leu Gly Gly Glu Asp Leu Ile Asp Val
            260                 265                 270

Leu Leu Arg Leu Met Asn Asp Gly Gly Leu Gln Phe Pro Ile Thr Asn
        275                 280                 285

Asp Asn Ile Lys Ala Ile Ile Phe Asp Met Phe Ala Ala Gly Thr Glu
    290                 295                 300

Thr Ser Ser Ser Thr Leu Val Trp Ala Met Val Gln Met Met Arg Asn
305                 310                 315                 320

Pro Thr Ile Leu Ala Lys Ala Gln Ala Glu Val Arg Glu Ala Phe Lys
                325                 330                 335

Gly Lys Glu Thr Phe Asp Glu Asn Asp Val Glu Glu Leu Lys Tyr Leu
            340                 345                 350

Lys Leu Val Ile Lys Glu Thr Leu Arg Leu His Pro Pro Val Pro Leu
        355                 360                 365

Leu Val Pro Arg Glu Cys Arg Glu Glu Thr Glu Ile Asn Gly Tyr Thr
    370                 375                 380

Ile Pro Val Lys Thr Lys Val Met Val Asn Val Trp Ala Leu Gly Arg
385                 390                 395                 400

Asp Pro Lys Tyr Trp Asp Asp Ala Asp Asn Phe Lys Pro Glu Arg Phe
                405                 410                 415

Glu Gln Cys Ser Val Asp Phe Ile Gly Asn Asn Phe Glu Tyr Leu Pro
            420                 425                 430

Phe Gly Gly Gly Arg Arg Ile Cys Pro Gly Ile Ser Phe Gly Leu Ala
```

```
        435                 440                 445

Asn Val Tyr Leu Pro Leu Ala Gln Leu Leu Tyr His Phe Asp Trp Lys
    450                 455                 460

Leu Pro Thr Gly Met Glu Pro Lys Asp Leu Asp Leu Thr Glu Leu Val
465                 470                 475                 480

Gly Val Thr Ala Ala Arg Lys Ser Asp Leu Met Leu Val Ala Thr Pro
                485                 490                 495

Tyr Gln Pro Ser Arg Glu
            500
```

<210> 20
<211> 508
<212> PRT
<213> Hyoscyamus muticus

<400> 20

```
Met Ala Leu Leu Leu Ala Val Phe Phe Phe Ser Leu Val Ser Ile Phe
1               5                   10                  15

Leu Phe Leu Ser Phe Leu Phe Leu Leu Arg Lys Trp Lys Asn Ser Asn
            20                  25                  30

Ser Gln Ser Lys Lys Leu Pro Pro Gly Pro Trp Lys Leu Pro Leu Leu
        35                  40                  45

Gly Ser Met Leu His Met Val Gly Gly Leu Pro His His Val Leu Arg
    50                  55                  60

Asp Leu Ala Lys Lys Tyr Gly Pro Leu Met His Leu Gln Leu Gly Glu
65                  70                  75                  80

Val Ser Ala Val Val Val Thr Ser Pro Asp Met Ala Lys Glu Val Leu
                85                  90                  95

Lys Thr His Asp Ile Ala Phe Ala Ser Arg Pro Lys Leu Leu Ala Pro
            100                 105                 110
```

```
Glu Ile Val Cys Tyr Asn Arg Ser Asp Ile Ala Phe Cys Pro Tyr Gly
        115                 120                 125

Asp Tyr Trp Arg Gln Met Arg Lys Ile Cys Val Leu Glu Val Leu Ser
    130                 135                 140

Ala Lys Asn Val Arg Ser Phe Ser Ser Ile Arg Arg Asp Glu Val Leu
145                 150                 155                 160

Arg Leu Val Asn Phe Val Arg Ser Ser Thr Ser Glu Pro Val Asn Phe
                165                 170                 175

Thr Glu Arg Leu Phe Leu Phe Thr Ser Ser Met Thr Cys Arg Ser Ala
            180                 185                 190

Phe Gly Lys Val Phe Lys Glu Gln Glu Thr Phe Ile Gln Leu Ile Lys
        195                 200                 205

Glu Val Ile Gly Leu Ala Gly Gly Phe Asp Val Ala Asp Ile Phe Pro
    210                 215                 220

Ser Leu Lys Phe Leu His Val Leu Thr Gly Met Glu Gly Lys Ile Met
225                 230                 235                 240

Lys Ala His His Lys Val Asp Ala Ile Val Glu Asp Val Ile Asn Glu
                245                 250                 255

His Lys Lys Asn Leu Ala Met Gly Lys Thr Asn Gly Ala Leu Gly Gly
            260                 265                 270

Glu Asp Leu Ile Asp Val Leu Leu Arg Leu Met Asn Asp Gly Gly Leu
        275                 280                 285

Gln Phe Pro Ile Thr Asn Asp Asn Ile Lys Ala Ile Ile Phe Asp Met
    290                 295                 300

Phe Ala Ala Gly Thr Glu Thr Ser Ser Ser Thr Leu Val Trp Ala Met
305                 310                 315                 320

Val Gln Met Met Arg Asn Pro Thr Ile Leu Ala Lys Ala Gln Ala Glu
                325                 330                 335
```

```
Val Arg Glu Ala Phe Lys Gly Lys Glu Thr Phe Asp Glu Asn Asp Val
            340                 345                 350

Glu Glu Leu Lys Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu Arg Leu
        355                 360                 365

His Pro Pro Val Pro Leu Leu Val Pro Arg Glu Cys Arg Glu Glu Thr
    370                 375                 380

Glu Ile Asn Gly Tyr Thr Ile Pro Val Lys Thr Lys Val Met Val Asn
385                 390                 395                 400

Val Trp Ala Leu Gly Arg Asp Pro Lys Tyr Trp Asp Asp Ala Asp Asn
                405                 410                 415

Phe Lys Pro Glu Arg Phe Glu Gln Cys Ser Val Asp Phe Ile Gly Asn
            420                 425                 430

Asn Phe Glu Tyr Leu Pro Phe Gly Gly Gly Arg Arg Ile Cys Pro Gly
        435                 440                 445

Ile Ser Phe Gly Leu Ala Asn Val Tyr Leu Pro Leu Ala Gln Leu Leu
    450                 455                 460

Tyr His Phe Asp Trp Lys Leu Pro Thr Gly Met Glu Pro Lys Asp Leu
465                 470                 475                 480

Asp Leu Thr Glu Leu Val Gly Val Thr Ala Ala Arg Lys Ser Asp Leu
                485                 490                 495

Met Leu Val Ala Thr Pro Tyr Gln Pro Ser Arg Glu
            500                 505
```

<210> 21
<211> 1524
<212> DNA
<213> Hyoscyamus muticus

<400> 21
atggctctgt tattagcagt tttcttcttc tccctggtct caatctttct gttcctgtcc 60

tttctgttcc tgctgcgtaa atggaaaaac tcaaactccc aatcgaaaaa actgccgccg 120

ggtccgtgga aactgccgct gctgggctct atgctgcaca tggttggcgg cctgccgcat 180

cacgttctgc gtgatctggc gaaaaaatat ggtccgctga tgcatctgca actgggcgaa 240

gtctccgccg tggttgtcac ctcaccggat atggcaaaag aagtgctgaa aacgcatgac 300

attgcgttcg cctcccgtcc gaaactgctg gccccggaaa ttgtgtgcta caaccgctca 360

gatattgcat tttgtccgta tggtgactac tggcgtcaaa tgcgcaaaat ttgcgtcctg 420

gaagtgctgt cggccaaaaa tgtgcgcagc tttagctcta ttcgtcgtga tgaagttctg 480

cgtctggtta acttcgtccg cagttccacc tcggagccgg tgaattttac ggaacgtctg 540

tttctgttca cctcatcgat gacctgccgt agcgcatttg gtaaagtttt caaagaacag 600

gaaaccttca ttcaactgat caaagaagtc attggcctgg ccggcggttt tgatgtggca 660

gacatctttc cgagtctgaa attcctgcat gttctgaccg gcatggaagg caaaattatg 720

aaagctcatc acaaagtcga tgcgattgtg gaagacgtta tcaacgaaca caagaaaaac 780

ctggcgatgg gcaaaacgaa cggcgcactg ggcggtgaag atctgatcga cgttctgctg 840

cgtctgatga atgatggcgg cctgcaattt ccgatcacca acgataatat caaagctatt 900

atctttgata tgtttgcggc gggcaccgaa accagcagca gcaccctggt gtgggcgatg 960

gtgcagatga tgcgtaaccc gacgattctg gcaaaagctc aagcggaagt gcgcgaagcc 1020

ttcaaaggca aagaaacctt tgatgaaaat gacgttgaag aactgaaata tctgaaactg 1080

gtcatcaaag aaacgctgcg tctgcatccg ccggttccgc tgctggtccc gcgtgaatgc 1140

cgcgaagaaa ccgaaattaa cggttatacc atcccggtta aaacgaaagt gatggttaat 1200

gtctgggctc tgggccgtga tccgaaatac tgggatgacg cggacaactt taaaccggaa 1260

cgctttgaac agtgctctgt ggatttcatc ggcaacaact ttgaatatct gccgtttggc 1320

ggtggccgtc gcatttgtcc gggtatcagc ttcggcctgg ctaatgttta tctgccgctg 1380

gcgcaactgc tgtaccactt tgattggaaa ctgccgaccg gcatggaacc gaaagatctg 1440

gacctgaccg aactggtggg cgttacggca gctcgtaaat ctgatctgat gctggttgcg 1500

accccgtacc agccgagccg tgaa 1524

<210> 22
<211> 488
<212> PRT

<213> Lactuca sativa

<400> 22

```
Met Glu Leu Ser Ile Thr Thr Ser Ile Ala Leu Ala Thr Ile Val Phe
1               5                  10                  15


Phe Leu Tyr Lys Leu Ala Thr Arg Pro Lys Ser Thr Lys Lys Gln Leu
            20                  25                  30


Pro Glu Ala Ser Arg Leu Pro Ile Ile Gly His Met His His Leu Ile
        35                  40                  45


Gly Thr Met Pro His Arg Gly Val Met Asp Leu Ala Arg Lys His Gly
    50                  55                  60


Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Thr Ile Val Val Ser
65                  70                  75                  80


Ser Pro Lys Trp Ala Lys Glu Ile Leu Thr Thr Tyr Asp Ile Thr Phe
                85                  90                  95


Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Ile Ala Tyr His Asn
            100                 105                 110


Thr Asp Ile Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125


Lys Leu Cys Thr Leu Glu Leu Leu Ser Val Lys Lys Val Lys Ser Phe
    130                 135                 140


Gln Ser Ile Arg Glu Glu Glu Cys Trp Asn Leu Val Lys Glu Val Lys
145                 150                 155                 160


Glu Ser Gly Ser Gly Lys Pro Ile Asn Leu Ser Glu Ser Ile Phe Thr
                165                 170                 175


Met Ile Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190


Asp Gln Arg Glu Phe Thr Glu Ile Val Lys Glu Ile Leu Arg Gln Thr
        195                 200                 205
```

```
Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Phe Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Ala Arg Leu Thr Ser Ile His Lys Lys Leu
225                 230                 235                 240

Asp Asn Leu Ile Asn Asn Ile Val Ala Glu His His Val Ser Thr Ser
                245                 250                 255

Ser Lys Ala Asn Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Asp
            260                 265                 270

Ser Ala Glu Phe Pro Leu Thr Ala Asp Asn Val Lys Ala Ile Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Val Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320

Ala Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Lys Ile Gln Glu Glu
                325                 330                 335

Asp Ile Gln Asp Leu Ala Tyr Leu Asn Leu Val Ile Arg Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Glu
        355                 360                 365

Pro Val Asn Leu Ala Gly Tyr Glu Ile Ala Asn Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Ala Phe Ile Pro Glu Arg Phe Glu Asn Asn Pro Asn Asn Ile Met
                405                 410                 415
```

```
Gly Ala Asp Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ala Ala Leu Gly Leu Ala Asn Val Gln Leu Pro Leu Ala Asn
        435                 440                 445

Ile Leu Tyr His Phe Asn Trp Lys Leu Pro Asn Gly Ala Ser His Asp
    450                 455                 460

Gln Leu Asp Met Thr Glu Ser Phe Gly Ala Thr Val Gln Arg Lys Thr
465                 470                 475                 480

Glu Leu Leu Leu Val Pro Ser Phe
                485
```

<210> 23
<211> 488
<212> PRT
<213> Lactuca sativa

<400> 23

```
Met Ala Leu Leu Leu Ala Val Phe Ile Ala Leu Ala Thr Ile Val Phe
1               5                   10                  15

Phe Leu Tyr Lys Leu Ala Thr Arg Pro Lys Ser Thr Lys Lys Gln Leu
            20                  25                  30

Pro Glu Ala Ser Arg Leu Pro Ile Ile Gly His Met His His Leu Ile
        35                  40                  45

Gly Thr Met Pro His Arg Gly Val Met Asp Leu Ala Arg Lys His Gly
    50                  55                  60

Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Thr Ile Val Val Ser
65                  70                  75                  80

Ser Pro Lys Trp Ala Lys Glu Ile Leu Thr Thr Tyr Asp Ile Thr Phe
                85                  90                  95

Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Ile Ala Tyr His Asn
            100                 105                 110
```

```
Thr Asp Ile Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125

Lys Leu Cys Thr Leu Glu Leu Leu Ser Val Lys Lys Val Lys Ser Phe
    130                 135                 140

Gln Ser Ile Arg Glu Glu Glu Cys Trp Asn Leu Val Lys Glu Val Lys
145                 150                 155                 160

Glu Ser Gly Ser Gly Lys Pro Ile Asn Leu Ser Glu Ser Ile Phe Thr
                165                 170                 175

Met Ile Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190

Asp Gln Arg Glu Phe Thr Glu Ile Val Lys Glu Ile Leu Arg Gln Thr
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Phe Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Ala Arg Leu Thr Ser Ile His Lys Lys Leu
225                 230                 235                 240

Asp Asn Leu Ile Asn Asn Ile Val Ala Glu His His Val Ser Thr Ser
                245                 250                 255

Ser Lys Ala Asn Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Asp
            260                 265                 270

Ser Ala Glu Phe Pro Leu Thr Ala Asp Asn Val Lys Ala Ile Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Val Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320

Ala Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Lys Ile Gln Glu Glu
```

325 330 335

Asp Ile Gln Asp Leu Ala Tyr Leu Asn Leu Val Ile Arg Glu Thr Leu
340 345 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Glu
355 360 365

Pro Val Asn Leu Ala Gly Tyr Glu Ile Ala Asn Lys Thr Lys Leu Ile
370 375 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385 390 395 400

Glu Ala Phe Ile Pro Glu Arg Phe Glu Asn Asn Pro Asn Asn Ile Met
405 410 415

Gly Ala Asp Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
420 425 430

Pro Gly Ala Ala Leu Gly Leu Ala Asn Val Gln Leu Pro Leu Ala Asn
435 440 445

Ile Leu Tyr His Phe Asn Trp Lys Leu Pro Asn Gly Ala Ser His Asp
450 455 460

Gln Leu Asp Met Thr Glu Ser Phe Gly Ala Thr Val Gln Arg Lys Thr
465 470 475 480

Glu Leu Leu Leu Val Pro Ser Phe
485

<210> 24
<211> 1464
<212> DNA
<213> Lactuca sativa

<400> 24
atggctctgt tattagcagt tttcatcgca ctggctacca tcgtcttctt cctgtataaa 60

ctggcaacgc gcccgaaatc taccaaaaaa caactgccgg aagcgagccg tctgccgatt 120

atcggccaca tgcatcacct gattggcacc atgccgcacc gtggtgtcat ggatctggcc 180

cgcaaacatg gctcgctgat gcatctgcaa ctgggcgaag tgagcaccat tgtggttagc 240

tctccgaaat gggcaaaaga aattctgacc acctatgata ttacctttgc taaccgcccg 300

gaaaccctga cgggcgaaat tatcgcgtac cataatacgg acattgtgct ggccccgtat 360

ggtgaatact ggcgtcaact gcgtaaactg tgcaccctgg aactgctgtc cgttaaaaaa 420

gtcaaatcat ttcaatcgat tcgtgaagaa gaatgttgga acctggtgaa agaagttaaa 480

gaaagcggct ctggtaaacc gattaatctg agtgaatcca tcttcaccat gattgcgacg 540

atcctgagtc gtgcggcctt tggcaaaggt attaaagatc agcgcgaatt taccgaaatt 600

gtcaaagaaa tcctgcgtca aacgggcggt ttcgatgtgg cagacatttt tccgagcaaa 660

aaattcctgc atcacctgtc tggcaaacgt gctcgcctga ccagtatcca taaaaaactg 720

gataacctga tcaacaatat cgtcgcggaa catcatgtga gcaccagcag caaagcgaat 780

gaaacgctgc tggatgttct gctgcgcctg aaagacagtg ccgaatttcc gctgaccgca 840

gacaacgtca aagctattat cctggatatg ttcggtgcag gcaccgatac cagcagcgca 900

acggtggaat gggccattag cgaactgatc cgttgcccgc gcgcaatgga aaaagttcag 960

gcagaactgc gtcaagctct gaacggtaaa gaaaaaatcc aggaagaaga tattcaagac 1020

ctggcctatc tgaatctggt gattcgtgaa accctgcgtc tgcacccgcc gctgccgctg 1080

gttatgccgc gtgaatgccg tgagccggtg aacctggcgg gctatgaaat cgccaataaa 1140

accaaactga tcgtcaatgt gtttgcgatt aaccgtgacc cggaatactg gaaagacgcg 1200

gaagccttta tcccggaacg ttttgaaaac aatccgaaca atatcatggg tgcagattat 1260

gaatacctgc cgtttggcgc tggtcgtcgc atgtgtccgg gcgcagctct gggtctggca 1320

aacgttcaac tgccgctggc gaacattctg taccatttca actggaaact gccgaatggc 1380

gcgtcccacg atcaactgga catgaccgaa tcatttggtg ccaccgtgca acgtaaaacg 1440

gaactgctgc tggttccgag cttc 1464

<210> 25
<211> 504
<212> PRT
<213> Nicotiani tabacum

<400> 25

Met Gln Phe Phe Ser Leu Val Ser Ile Phe Leu Phe Leu Ser Phe Leu

```
1               5                   10                  15

Phe Leu Leu Arg Lys Trp Lys Asn Ser Asn Ser Gln Ser Lys Lys Leu
            20                  25                  30

Pro Pro Gly Pro Trp Lys Ile Pro Ile Leu Gly Ser Met Leu His Met
        35                  40                  45

Ile Gly Gly Glu Pro His His Val Leu Arg Asp Leu Ala Lys Lys Tyr
    50                  55                  60

Gly Pro Leu Met His Leu Gln Leu Gly Glu Ile Ser Ala Val Val Val
65                  70                  75                  80

Thr Ser Arg Asp Met Ala Lys Glu Val Leu Lys Thr His Asp Val Val
                85                  90                  95

Phe Ala Ser Arg Pro Lys Ile Val Ala Met Asp Ile Ile Cys Tyr Asn
            100                 105                 110

Gln Ser Asp Ile Ala Phe Ser Pro Tyr Gly Asp His Trp Arg Gln Met
        115                 120                 125

Arg Lys Ile Cys Val Met Glu Leu Leu Asn Ala Lys Asn Val Arg Ser
    130                 135                 140

Phe Ser Ser Ile Arg Arg Asp Glu Val Val Arg Leu Ile Asp Ser Ile
145                 150                 155                 160

Arg Ser Asp Ser Ser Ser Gly Glu Leu Val Asn Phe Thr Gln Arg Ile
                165                 170                 175

Ile Trp Phe Ala Ser Ser Met Thr Cys Arg Ser Ala Phe Gly Gln Val
            180                 185                 190

Leu Lys Gly Gln Asp Ile Phe Ala Lys Lys Ile Arg Glu Val Ile Gly
        195                 200                 205

Leu Ala Glu Gly Phe Asp Val Val Asp Ile Phe Pro Thr Tyr Lys Phe
    210                 215                 220
```

```
Leu His Val Leu Ser Gly Met Lys Arg Lys Leu Leu Asn Ala His Leu
225                 230                 235                 240

Lys Val Asp Ala Ile Val Glu Asp Val Ile Asn Glu His Lys Lys Asn
                245                 250                 255

Leu Ala Ala Gly Lys Ser Asn Gly Ala Leu Gly Gly Glu Asp Leu Ile
            260                 265                 270

Asp Val Leu Leu Arg Leu Met Asn Asp Thr Ser Leu Gln Phe Pro Ile
        275                 280                 285

Thr Asn Asp Asn Ile Lys Ala Val Ile Val Asp Met Phe Ala Ala Gly
    290                 295                 300

Thr Glu Thr Ser Ser Thr Thr Thr Val Trp Ala Met Ala Glu Met Met
305                 310                 315                 320

Lys Asn Pro Ser Val Phe Thr Lys Ala Gln Ala Glu Val Arg Glu Ala
                325                 330                 335

Phe Arg Asp Lys Val Ser Phe Asp Glu Asn Asp Val Glu Glu Leu Lys
            340                 345                 350

Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu Arg Leu His Pro Pro Ser
        355                 360                 365

Pro Leu Leu Val Pro Arg Glu Cys Arg Glu Asp Thr Asp Ile Asn Gly
    370                 375                 380

Tyr Thr Ile Pro Ala Lys Thr Lys Val Met Val Asn Val Trp Ala Leu
385                 390                 395                 400

Gly Arg Asp Pro Lys Tyr Trp Asp Asp Ala Glu Ser Phe Lys Pro Glu
                405                 410                 415

Arg Phe Glu Gln Cys Ser Val Asp Phe Phe Gly Asn Asn Phe Glu Phe
            420                 425                 430

Leu Pro Phe Gly Gly Gly Arg Arg Ile Cys Pro Gly Met Ser Phe Gly
```

```
        435                 440                 445

Leu Ala Asn Leu Tyr Leu Pro Leu Ala Gln Leu Leu Tyr His Phe Asp
    450                 455                 460

Trp Lys Leu Pro Thr Gly Ile Met Pro Arg Asp Leu Asp Leu Thr Glu
465                 470                 475                 480

Leu Ser Gly Ile Thr Ile Ala Arg Lys Gly Gly Leu Tyr Leu Asn Ala
                485                 490                 495

Thr Pro Tyr Gln Pro Ser Arg Glu
            500
```

<210> 26
<211> 510
<212> PRT
<213> Nicotiani tabacum

<400> 26

```
Met Ala Leu Leu Leu Ala Val Phe Phe Phe Ser Leu Val Ser Ile Phe
1               5                   10                  15

Leu Phe Leu Ser Phe Leu Phe Leu Leu Arg Lys Trp Lys Asn Ser Asn
            20                  25                  30

Ser Gln Ser Lys Lys Leu Pro Pro Gly Pro Trp Lys Ile Pro Ile Leu
        35                  40                  45

Gly Ser Met Leu His Met Ile Gly Gly Glu Pro His His Val Leu Arg
    50                  55                  60

Asp Leu Ala Lys Lys Tyr Gly Pro Leu Met His Leu Gln Leu Gly Glu
65                  70                  75                  80

Ile Ser Ala Val Val Val Thr Ser Arg Asp Met Ala Lys Glu Val Leu
                85                  90                  95

Lys Thr His Asp Val Val Phe Ala Ser Arg Pro Lys Ile Val Ala Met
            100                 105                 110
```

```
Asp Ile Ile Cys Tyr Asn Gln Ser Asp Ile Ala Phe Ser Pro Tyr Gly
        115                 120                 125

Asp His Trp Arg Gln Met Arg Lys Ile Cys Val Met Glu Leu Leu Asn
    130                 135                 140

Ala Lys Asn Val Arg Ser Phe Ser Ser Ile Arg Arg Asp Glu Val Val
145                 150                 155                 160

Arg Leu Ile Asp Ser Ile Arg Ser Asp Ser Ser Ser Gly Glu Leu Val
                165                 170                 175

Asn Phe Thr Gln Arg Ile Ile Trp Phe Ala Ser Ser Met Thr Cys Arg
            180                 185                 190

Ser Ala Phe Gly Gln Val Leu Lys Gly Gln Asp Ile Phe Ala Lys Lys
        195                 200                 205

Ile Arg Glu Val Ile Gly Leu Ala Glu Gly Phe Asp Val Val Asp Ile
    210                 215                 220

Phe Pro Thr Tyr Lys Phe Leu His Val Leu Ser Gly Met Lys Arg Lys
225                 230                 235                 240

Leu Leu Asn Ala His Leu Lys Val Asp Ala Ile Val Glu Asp Val Ile
                245                 250                 255

Asn Glu His Lys Lys Asn Leu Ala Ala Gly Lys Ser Asn Gly Ala Leu
            260                 265                 270

Gly Gly Glu Asp Leu Ile Asp Val Leu Leu Arg Leu Met Asn Asp Thr
        275                 280                 285

Ser Leu Gln Phe Pro Ile Thr Asn Asp Asn Ile Lys Ala Val Ile Val
    290                 295                 300

Asp Met Phe Ala Ala Gly Thr Glu Thr Ser Ser Thr Thr Thr Val Trp
305                 310                 315                 320

Ala Met Ala Glu Met Met Lys Asn Pro Ser Val Phe Thr Lys Ala Gln
                325                 330                 335
```

```
Ala Glu Val Arg Glu Ala Phe Arg Asp Lys Val Ser Phe Asp Glu Asn
            340                 345                 350

Asp Val Glu Glu Leu Lys Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu
        355                 360                 365

Arg Leu His Pro Pro Ser Pro Leu Leu Val Pro Arg Glu Cys Arg Glu
    370                 375                 380

Asp Thr Asp Ile Asn Gly Tyr Thr Ile Pro Ala Lys Thr Lys Val Met
385                 390                 395                 400

Val Asn Val Trp Ala Leu Gly Arg Asp Pro Lys Tyr Trp Asp Asp Ala
                405                 410                 415

Glu Ser Phe Lys Pro Glu Arg Phe Glu Gln Cys Ser Val Asp Phe Phe
            420                 425                 430

Gly Asn Asn Phe Glu Phe Leu Pro Phe Gly Gly Gly Arg Arg Ile Cys
        435                 440                 445

Pro Gly Met Ser Phe Gly Leu Ala Asn Leu Tyr Leu Pro Leu Ala Gln
    450                 455                 460

Leu Leu Tyr His Phe Asp Trp Lys Leu Pro Thr Gly Ile Met Pro Arg
465                 470                 475                 480

Asp Leu Asp Leu Thr Glu Leu Ser Gly Ile Thr Ile Ala Arg Lys Gly
                485                 490                 495

Gly Leu Tyr Leu Asn Ala Thr Pro Tyr Gln Pro Ser Arg Glu
            500                 505                 510
```

<210> 27
<211> 1530
<212> DNA
<213> Nicotiani tabacum

<400> 27
atggctctgt tattagcagt tttcttcttc tccctggtct caatcttcct gttcctgtcc 60

tttctgttcc tgctgcgtaa atggaaaaac tctaatagcc aatccaaaaa actgccgccg 120

ggtccgtgga aaattccgat cctgggctct atgctgcaca tgattggcgg tgaaccgcat 180

catgtgctgc gtgatctggc gaaaaaatat ggtccgctga tgcatctgca actgggcgaa 240

atctctgcgg tggttgtcac gagtcgtgac atggccaaag aagtgctgaa aacccatgat 300

gtggtttttg catctcgccc gaaaatcgtt gctatggata ttatctgcta taaccagtcg 360

gacatcgcgt tcagcccgta cggtgatcac tggcgtcaaa tgcgcaaaat ttgtgtcatg 420

gaactgctga acgccaaaaa tgtgcgcagt tttagctcta ttcgtcgtga tgaagtcgtg 480

cgtctgattg attccatccg ctcagacagt tcctcaggcg aactggtgaa ttttacgcag 540

cgtattatct ggttcgcatc gagcatgacc tgccgctcgg cttttggtca ggttctgaaa 600

ggccaagata tttttgcgaa gaaaattcgt gaagtgatcg gtctggccga aggcttcgat 660

gttgtggata tttttccgac ctataaattc ctgcatgtcc tgagcggtat gaaacgcaaa 720

ctgctgaacg cgcacctgaa agttgatgcc attgtcgaag acgtgatcaa cgaacataag 780

aaaaacctgg cggcgggtaa atccaacggc gcactgggcg gtgaagatct gattgacgtg 840

ctgctgcgtc tgatgaatga taccagcctg caatttccga tcaccaacga caacattaaa 900

gcggtgatcg ttgatatgtt cgcggcgggc accgaaacct ctagtaccac gaccgtttgg 960

gcgatggccg aaatgatgaa aaacccgtcg gtgtttacca aagcacaagc ggaagtgcgt 1020

gaagcgtttc gtgataaagt tagcttcgat gaaaatgatg tggaagaact gaaatacctg 1080

aaactggtga ttaaagaaac gctgcgtctg catccgccga gcccgctgct ggttccgcgt 1140

gaatgccgtg aagataccga cattaacggt tatacgatcc cggcaaaaac caaagtcatg 1200

gtgaatgttt gggctctggg ccgtgacccg aaatactggg atgacgcaga atcctttaaa 1260

ccggaacgct ttgaacagtg ctcagtggat ttctttggta acaactttga atttctgccg 1320

tttggcggtg gccgtcgcat ttgtccgggt atgtccttcg gcctggcgaa cctgtatctg 1380

ccgctggccc aactgctgta ccactttgat tggaaactgc cgacgggtat tatgccgcgt 1440

gatctggacc tgacggaact gtctggcatt accatcgcac gcaaaggtgg cctgtatctg 1500

aatgctaccc cgtaccagcc gagtcgtgaa 1530

<210> 28
<211> 522
<212> PRT

<213> Citrus x paradisi

<400> 28

```
Met Glu Leu Pro Leu Lys Ser Ile Ala Leu Thr Ile Val Ile Val Thr
1               5                  10                  15


Val Leu Thr Trp Ala Trp Arg Val Leu Asn Trp Val Trp Leu Arg Pro
            20                  25                  30


Lys Lys Leu Glu Lys Phe Leu Arg Gln Gln Gly Leu Lys Gly Asn Ser
        35                  40                  45


Tyr Arg Leu Leu Phe Gly Asp Leu Lys Glu Asn Ser Ile Glu Leu Lys
    50                  55                  60


Glu Ala Lys Ala Arg Pro Leu Ser Leu Asp Asp Asp Ile Ala Ile Arg
65                  70                  75                  80


Val Asn Pro Phe Leu His Lys Leu Val Asn Asp Tyr Gly Lys Asn Ser
                85                  90                  95


Phe Met Trp Phe Gly Pro Thr Pro Arg Val Asn Ile Met Asn Pro Asp
            100                 105                 110


Gln Ile Lys Ala Ile Phe Thr Lys Ile Asn Asp Phe Gln Lys Val Asn
        115                 120                 125


Ser Ile Pro Leu Ala Arg Leu Leu Ile Val Gly Leu Ala Thr Leu Glu
    130                 135                 140


Gly Glu Lys Trp Ala Lys His Arg Lys Leu Ile Asn Pro Ala Phe His
145                 150                 155                 160


Gln Glu Lys Leu Lys Leu Met Leu Pro Ala Phe Tyr Leu Ser Cys Ile
                165                 170                 175


Glu Ile Ile Thr Lys Trp Glu Lys Gln Met Ser Val Glu Gly Ser Ser
            180                 185                 190


Glu Leu Asp Val Trp Pro Tyr Leu Ala Asn Leu Thr Ser Asp Val Ile
        195                 200                 205
```

```
Ser Arg Thr Ala Phe Gly Ser Ser Tyr Glu Glu Gly Arg Arg Ile Phe
    210                 215                 220

Gln Leu Gln Ala Glu Leu Ala Glu Leu Thr Met Gln Val Phe Arg Ser
225                 230                 235                 240

Val His Ile Pro Gly Trp Arg Phe Leu Pro Thr Lys Arg Asn Arg Arg
                245                 250                 255

Met Lys Glu Ile Asp Lys Glu Ile Arg Ala Ser Leu Met Gly Ile Ile
            260                 265                 270

Lys Asn Arg Glu Lys Ala Met Arg Ala Gly Glu Ala Ala Asn Asn Asp
        275                 280                 285

Leu Leu Gly Ile Leu Met Glu Thr Ser Phe Arg Glu Ile Glu Glu His
    290                 295                 300

Gly Asn Asn Lys Asn Val Gly Phe Ser Met Asn Asp Val Ile Glu Glu
305                 310                 315                 320

Cys Lys Leu Phe Tyr Phe Ala Gly Gln Glu Thr Thr Ser Val Leu Leu
                325                 330                 335

Asn Trp Thr Met Val Leu Leu Ser Lys His Gln Asp Trp Gln Glu Arg
            340                 345                 350

Ala Arg Gln Glu Val Leu Gln Val Phe Gly Asn Asn Lys Pro Asp Tyr
        355                 360                 365

Asp Gly Leu Asn His Leu Lys Ile Val Gln Met Ile Leu Tyr Glu Val
    370                 375                 380

Leu Arg Leu Tyr Pro Pro Val Thr Val Leu Ser Arg Ala Val Phe Lys
385                 390                 395                 400

Glu Thr Lys Leu Gly Asn Leu Thr Leu Pro Ala Gly Val Gln Ile Gly
                405                 410                 415
```

```
Leu Pro Met Ile Leu Val His Gln Asp Pro Glu Leu Trp Gly Asp Asp
            420                 425                 430

Ala Val Glu Phe Lys Pro Glu Arg Phe Ala Glu Gly Ile Ser Lys Ala
        435                 440                 445

Ala Lys Asn Gln Val Ser Tyr Phe Pro Phe Ala Leu Gly Pro Arg Ile
    450                 455                 460

Cys Val Gly Gln Asn Phe Ala Leu Val Glu Ala Lys Met Ala Thr Ala
465                 470                 475                 480

Met Ile Leu Gln Asn Tyr Ser Phe Glu Leu Ser Pro Ser Tyr Val His
                485                 490                 495

Ala Pro Thr Ala Val Pro Thr Leu His Pro Glu Leu Gly Thr Gln Leu
            500                 505                 510

Ile Leu Arg Lys Leu Trp Cys Lys Asn Asn
        515                 520
```

<210> 29
<211> 523
<212> PRT
<213> Citrus x paradisi

<400> 29

```
Met Ala Leu Leu Leu Ala Val Phe Ile Ala Leu Thr Ile Val Ile Val
1               5                   10                  15

Thr Val Leu Thr Trp Ala Trp Arg Val Leu Asn Trp Val Trp Leu Arg
            20                  25                  30

Pro Lys Lys Leu Glu Lys Phe Leu Arg Gln Gln Gly Leu Lys Gly Asn
        35                  40                  45

Ser Tyr Arg Leu Leu Phe Gly Asp Leu Lys Glu Asn Ser Ile Glu Leu
    50                  55                  60

Lys Glu Ala Lys Ala Arg Pro Leu Ser Leu Asp Asp Asp Ile Ala Ile
65                  70                  75                  80
```

```
Arg Val Asn Pro Phe Leu His Lys Leu Val Asn Asp Tyr Gly Lys Asn
                85                  90                  95

Ser Phe Met Trp Phe Gly Pro Thr Pro Arg Val Asn Ile Met Asn Pro
            100                 105                 110

Asp Gln Ile Lys Ala Ile Phe Thr Lys Ile Asn Asp Phe Gln Lys Val
        115                 120                 125

Asn Ser Ile Pro Leu Ala Arg Leu Leu Ile Val Gly Leu Ala Thr Leu
    130                 135                 140

Glu Gly Glu Lys Trp Ala Lys His Arg Lys Leu Ile Asn Pro Ala Phe
145                 150                 155                 160

His Gln Glu Lys Leu Lys Leu Met Leu Pro Ala Phe Tyr Leu Ser Cys
                165                 170                 175

Ile Glu Ile Ile Thr Lys Trp Glu Lys Gln Met Ser Val Glu Gly Ser
            180                 185                 190

Ser Glu Leu Asp Val Trp Pro Tyr Leu Ala Asn Leu Thr Ser Asp Val
        195                 200                 205

Ile Ser Arg Thr Ala Phe Gly Ser Ser Tyr Glu Glu Gly Arg Arg Ile
    210                 215                 220

Phe Gln Leu Gln Ala Glu Leu Ala Glu Leu Thr Met Gln Val Phe Arg
225                 230                 235                 240

Ser Val His Ile Pro Gly Trp Arg Phe Leu Pro Thr Lys Arg Asn Arg
                245                 250                 255

Arg Met Lys Glu Ile Asp Lys Glu Ile Arg Ala Ser Leu Met Gly Ile
            260                 265                 270

Ile Lys Asn Arg Glu Lys Ala Met Arg Ala Gly Glu Ala Ala Asn Asn
        275                 280                 285

Asp Leu Leu Gly Ile Leu Met Glu Thr Ser Phe Arg Glu Ile Glu Glu
```

```
    290                 295                 300

His Gly Asn Asn Lys Asn Val Gly Phe Ser Met Asn Asp Val Ile Glu
305                 310                 315                 320

Glu Cys Lys Leu Phe Tyr Phe Ala Gly Gln Glu Thr Thr Ser Val Leu
                325                 330                 335

Leu Asn Trp Thr Met Val Leu Leu Ser Lys His Gln Asp Trp Gln Glu
            340                 345                 350

Arg Ala Arg Gln Glu Val Leu Gln Val Phe Gly Asn Asn Lys Pro Asp
        355                 360                 365

Tyr Asp Gly Leu Asn His Leu Lys Ile Val Gln Met Ile Leu Tyr Glu
    370                 375                 380

Val Leu Arg Leu Tyr Pro Pro Val Thr Val Leu Ser Arg Ala Val Phe
385                 390                 395                 400

Lys Glu Thr Lys Leu Gly Asn Leu Thr Leu Pro Ala Gly Val Gln Ile
                405                 410                 415

Gly Leu Pro Met Ile Leu Val His Gln Asp Pro Glu Leu Trp Gly Asp
            420                 425                 430

Asp Ala Val Glu Phe Lys Pro Glu Arg Phe Ala Glu Gly Ile Ser Lys
        435                 440                 445

Ala Ala Lys Asn Gln Val Ser Tyr Phe Pro Phe Ala Leu Gly Pro Arg
    450                 455                 460

Ile Cys Val Gly Gln Asn Phe Ala Leu Val Glu Ala Lys Met Ala Thr
465                 470                 475                 480

Ala Met Ile Leu Gln Asn Tyr Ser Phe Glu Leu Ser Pro Ser Tyr Val
                485                 490                 495

His Ala Pro Thr Ala Val Pro Thr Leu His Pro Glu Leu Gly Thr Gln
            500                 505                 510
```

Leu Ile Leu Arg Lys Leu Trp Cys Lys Asn Asn
515 520

<210> 30
<211> 1569
<212> DNA
<213> Citrus x paradisi

<400> 30
atggctctgt tattagcagt tttcattgct ctgacgattg ttattgttac ggtgctgacc 60

tgggcgtggc gtgtgctgaa ctgggtttgg ctgcgtccga aaaaactgga aaaatttctg 120

cgccagcaag gcctgaaggg taacagctat cgtctgctgt tcggcgatct gaaagaaaat 180

tctattgaac tgaaagaagc gaaagcccgt ccgctgagtc tggatgacga tattgcaatc 240

cgcgttaacc cgtttctgca taaactggtc aacgattacg gcaaaaattc ttttatgtgg 300

ttcggtccga ccccgcgcgt gaacattatg aacccggatc agattaaagc gatctttacg 360

aaaatcaacg atttccaaaa agttaatagc attccgctgg cgcgtctgct gatcgtcggc 420

ctggccaccc tggaaggtga aaaatgggca aaacatcgca aactgattaa cccggctttt 480

caccaagaaa aactgaaact gatgctgccg gcgttctatc tgtcctgcat cgaaattatc 540

acgaaatggg aaaaacagat gtcagtggaa ggtagctctg aactggacgt ttggccgtat 600

ctggccaatc tgaccagcga tgttatttct cgtacggcat ttggcagttc ctacgaagaa 660

ggtcgtcgca tcttccagtt acaggcggaa ctggccgaac tgaccatgca ggtttttcgt 720

tctgtccata ttccgggctg gcgtttcctg ccgacgaaac gcaaccgtcg catgaaagaa 780

attgacaaag aaatccgcgc cagtctgatg ggtattatca aaaatcgtga aaaagcaatg 840

cgcgctggcg aagcggccaa caatgatctg ctgggtattc tgatggaaac cagctttcgt 900

gaaatcgaag aacacggcaa caataaaaac gtcggtttca gcatgaatga cgtgatcgaa 960

gaatgtaaac tgttttattt cgctggccag gaaaccacgt cagttctgct gaactggacg 1020

atggtgctgc tgtcgaaaca tcaggattgg caagaacgtg cccgccagga agtcctgcaa 1080

gtgtttggca acaataaacc ggactacgat ggtctgaacc acctgaaaat tgtgcagatg 1140

atcctgtatg aagttctgcg tctgtatccg ccggtgacgg tgctgagccg tgcggtgttt 1200

aaagaaacca aactgggtaa tctgacgctg ccggcaggcg tccagattgg tctgccgatg 1260

atcctggtgc accaggaccc ggaactgtgg ggcgacgatg ctgtggaatt taaaccggaa 1320

cgtttcgcgg aaggtattag taaagcagct aaaaatcagg tttcctattt tccgttcgcg 1380

ctgggtccgc gtatttgcgt cggtcaaaac tttgcactgg tggaagctaa aatggcaacc 1440

gctatgatcc tgcaaaatta tagctttgaa ctgtcaccga gctatgttca tgcgccgacc 1500

gccgttccga cgctgcaccc ggaactgggc acgcaactga ttctgcgtaa actgtggtgt 1560

aaaaacaat 1569

<210> 31
<211> 495
<212> PRT
<213> Artemesia annua

<400> 31

Met Lys Ser Ile Leu Lys Ala Met Ala Leu Ser Leu Thr Thr Ser Ile
1 5 10 15

Ala Leu Ala Thr Ile Leu Leu Phe Val Tyr Lys Phe Ala Thr Arg Ser
20 25 30

Lys Ser Thr Lys Lys Ser Leu Pro Glu Pro Trp Arg Leu Pro Ile Ile
35 40 45

Gly His Met His His Leu Ile Gly Thr Thr Pro His Arg Gly Val Arg
50 55 60

Asp Leu Ala Arg Lys Tyr Gly Ser Leu Met His Leu Gln Leu Gly Glu
65 70 75 80

Val Pro Thr Ile Val Val Ser Ser Pro Lys Trp Ala Lys Glu Ile Leu
85 90 95

Thr Thr Tyr Asp Ile Thr Phe Ala Asn Arg Pro Glu Thr Leu Thr Gly
100 105 110

Glu Ile Val Leu Tyr His Asn Thr Asp Val Val Leu Ala Pro Tyr Gly
115 120 125

Glu Tyr Trp Arg Gln Leu Arg Lys Ile Cys Thr Leu Glu Leu Leu Ser
130 135 140

```
Val Lys Lys Val Lys Ser Phe Gln Ser Leu Arg Glu Glu Glu Cys Trp
145                 150                 155                 160

Asn Leu Val Gln Glu Ile Lys Ala Ser Gly Ser Gly Arg Pro Val Asn
                165                 170                 175

Leu Ser Glu Asn Val Phe Lys Leu Ile Ala Thr Ile Leu Ser Arg Ala
            180                 185                 190

Ala Phe Gly Lys Gly Ile Lys Asp Gln Lys Glu Leu Thr Glu Ile Val
        195                 200                 205

Lys Glu Ile Leu Arg Gln Thr Gly Gly Phe Asp Val Ala Asp Ile Phe
    210                 215                 220

Pro Ser Lys Lys Phe Leu His His Leu Ser Gly Lys Arg Ala Arg Leu
225                 230                 235                 240

Thr Ser Leu Arg Lys Lys Ile Asp Asn Leu Ile Asp Asn Leu Val Ala
                245                 250                 255

Glu His Thr Val Asn Thr Ser Ser Lys Thr Asn Glu Thr Leu Leu Asp
            260                 265                 270

Val Leu Leu Arg Leu Lys Asp Ser Ala Glu Phe Pro Leu Thr Ser Asp
        275                 280                 285

Asn Ile Lys Ala Ile Ile Leu Asp Met Phe Gly Ala Gly Thr Asp Thr
    290                 295                 300

Ser Ser Ser Thr Ile Glu Trp Ala Ile Ser Glu Leu Ile Lys Cys Pro
305                 310                 315                 320

Lys Ala Met Glu Lys Val Gln Ala Glu Leu Arg Lys Ala Leu Asn Gly
                325                 330                 335

Lys Glu Lys Ile His Glu Glu Asp Ile Gln Glu Leu Ser Tyr Leu Asn
            340                 345                 350

Met Val Ile Lys Glu Thr Leu Arg Leu His Pro Pro Leu Pro Leu Val
```

```
        355                 360                 365

Leu Pro Arg Glu Cys Arg Gln Pro Val Asn Leu Ala Gly Tyr Asn Ile
    370                 375                 380

Pro Asn Lys Thr Lys Leu Ile Val Asn Val Phe Ala Ile Asn Arg Asp
385                 390                 395                 400

Pro Glu Tyr Trp Lys Asp Ala Glu Ala Phe Ile Pro Glu Arg Phe Glu
                405                 410                 415

Asn Ser Ser Ala Thr Val Met Gly Ala Glu Tyr Glu Tyr Leu Pro Phe
            420                 425                 430

Gly Ala Gly Arg Arg Met Cys Pro Gly Ala Ala Leu Gly Leu Ala Asn
        435                 440                 445

Val Gln Leu Pro Leu Ala Asn Ile Leu Tyr His Phe Asn Trp Lys Leu
    450                 455                 460

Pro Asn Gly Val Ser Tyr Asp Gln Ile Asp Met Thr Glu Ser Ser Gly
465                 470                 475                 480

Ala Thr Met Gln Arg Lys Thr Glu Leu Leu Leu Val Pro Ser Phe
                485                 490                 495


<210>  32
<211>  488
<212>  PRT
<213>  Artemesia annua

<400>  32

Met Ala Leu Leu Leu Ala Val Phe Ile Ala Leu Ala Thr Ile Leu Leu
1               5                   10                  15

Phe Val Tyr Lys Phe Ala Thr Arg Ser Lys Ser Thr Lys Lys Ser Leu
            20                  25                  30

Pro Glu Pro Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Ile
        35                  40                  45
```

```
Gly Thr Thr Pro His Arg Gly Val Arg Asp Leu Ala Arg Lys Tyr Gly
    50                  55                  60

Ser Leu Met His Leu Gln Leu Gly Glu Val Pro Thr Ile Val Val Ser
65                  70                  75                  80

Ser Pro Lys Trp Ala Lys Glu Ile Leu Thr Thr Tyr Asp Ile Thr Phe
                85                  90                  95

Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Val Leu Tyr His Asn
            100                 105                 110

Thr Asp Val Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125

Lys Ile Cys Thr Leu Glu Leu Leu Ser Val Lys Lys Val Lys Ser Phe
    130                 135                 140

Gln Ser Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Gln Glu Ile Lys
145                 150                 155                 160

Ala Ser Gly Ser Gly Arg Pro Val Asn Leu Ser Glu Asn Val Phe Lys
                165                 170                 175

Leu Ile Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190

Asp Gln Lys Glu Leu Thr Glu Ile Val Lys Glu Ile Leu Arg Gln Thr
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Phe Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Ala Arg Leu Thr Ser Leu Arg Lys Lys Ile
225                 230                 235                 240

Asp Asn Leu Ile Asp Asn Leu Val Ala Glu His Thr Val Asn Thr Ser
                245                 250                 255

Ser Lys Thr Asn Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Asp
            260                 265                 270
```

```
Ser Ala Glu Phe Pro Leu Thr Ser Asp Asn Ile Lys Ala Ile Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ser Thr Ile Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Lys Cys Pro Lys Ala Met Glu Lys Val Gln
305                 310                 315                 320

Ala Glu Leu Arg Lys Ala Leu Asn Gly Lys Glu Lys Ile His Glu Glu
                325                 330                 335

Asp Ile Gln Glu Leu Ser Tyr Leu Asn Met Val Ile Lys Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Leu Pro Arg Glu Cys Arg Gln
        355                 360                 365

Pro Val Asn Leu Ala Gly Tyr Asn Ile Pro Asn Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Ala Phe Ile Pro Glu Arg Phe Glu Asn Ser Ser Ala Thr Val Met
                405                 410                 415

Gly Ala Glu Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ala Ala Leu Gly Leu Ala Asn Val Gln Leu Pro Leu Ala Asn
        435                 440                 445

Ile Leu Tyr His Phe Asn Trp Lys Leu Pro Asn Gly Val Ser Tyr Asp
    450                 455                 460

Gln Ile Asp Met Thr Glu Ser Ser Gly Ala Thr Met Gln Arg Lys Thr
465                 470                 475                 480
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Glu Leu Leu Leu Val Pro Ser Phe
485

<210> 33
<211> 1464
<212> DNA
<213> Artemesia annua

<400> 33
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ttcgctaccc gttccaaatc aacgaaaaaa tcactgccgg aaccgtggcg cctgccgatt 120

atcggtcaca tgcatcacct gatcggcacc accccgcatc gtggcgtgcg tgatctggca 180

cgcaaatatg gctcgctgat gcatctgcaa ctgggtgaag tcccgaccat tgtggttagc 240

tctccgaaat gggcgaaaga aatcctgacc acctatgata ttacctttgc caaccgcccg 300

gaaaccctga cgggcgaaat cgtgctgtac cacaatacgg atgtggtgct ggcgccgtat 360

ggtgaatact ggcgtcaact gcgtaaaatt tgcaccctgg aactgctgag tgtgaaaaaa 420

gttaaatctt tccagagcct gcgtgaagaa gaatgttgga acctggttca agaaattaaa 480

gcatcgggca gcggtcgccc ggttaacctg agtgaaaatg tctttaaact gattgctacc 540

atcctgtccc gtgcggcctt cggcaaaggt atcaaagatc agaaagaact gaccgaaatt 600

gtcaaagaaa tcctgcgcca aacgggcggt tttgatgtgg cggacatttt tccgtcgaaa 660

aaattcctgc atcacctgag cggtaaacgt gcccgcctga ccagcctgcg taagaaaatt 720

gataacctga tcgacaatct ggtcgcggaa cataccgtga acacgagttc caaaaccaat 780

gaaacgctgc tggatgtgct gctgcgcctg aaagactccg ccgaatttcc gctgacctca 840

gataatatca aagcgattat cctggatatg ttcggtgcag gcaccgatac cagcagcagc 900

accattgaat gggcaatctc agaactgatt aaatgcccga aagctatgga aaaagtccag 960

gcagaactgc gcaaagctct gaacggcaaa gaaaaaatcc atgaagaaga tattcaagaa 1020

ctgtcttacc tgaacatggt tatcaaagaa accctgcgtc tgcacccgcc gctgccgctg 1080

gtgctgccgc gtgaatgtcg ccagccggtt aacctggcag gctataacat cccgaataaa 1140

acgaaactga tcgttaacgt ctttgctatt aaccgtgacc cggaatactg gaaagacgcg 1200

gaagccttta tcccggaacg ctttgaaaac agcagcgcga ccgtgatggg tgccgaatat 1260

gaatacctgc cgtttggcgc gggtcgtcgc atgtgtccgg gcgcagctct gggtctggca 1320

aacgtgcaac tgccgctggc taatatcctg tatcacttca actggaaact gccgaatggc 1380

gttagctacg atcaaattga catgaccgaa agctcaggtg ccacgatgca acgcaaaacc 1440

gaactgctgc tggtgccgtc cttc 1464

<210> 34
<211> 509
<212> PRT
<213> Arabidopsis thaliana

<400> 34

Met Ala Phe Phe Ser Met Ile Ser Ile Leu Leu Gly Phe Val Ile Ser
1 5 10 15

Ser Phe Ile Phe Ile Phe Phe Phe Lys Lys Leu Leu Ser Phe Ser Arg
20 25 30

Lys Asn Met Ser Glu Val Ser Thr Leu Pro Ser Val Pro Val Val Pro
35 40 45

Gly Phe Pro Val Ile Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro
50 55 60

His Lys Thr Phe Thr Arg Trp Ser Glu Ile Tyr Gly Pro Ile Tyr Ser
65 70 75 80

Ile Lys Met Gly Ser Ser Ser Leu Ile Val Leu Asn Ser Thr Glu Thr
85 90 95

Ala Lys Glu Ala Met Val Thr Arg Phe Ser Ser Ile Ser Thr Arg Lys
100 105 110

Leu Ser Asn Ala Leu Thr Val Leu Thr Cys Asp Lys Ser Met Val Ala
115 120 125

Thr Ser Asp Tyr Asp Asp Phe His Lys Leu Val Lys Arg Cys Leu Leu
130 135 140

Asn Gly Leu Leu Gly Ala Asn Ala Gln Lys Arg Lys Arg His Tyr Arg
145 150 155 160

```
Asp Ala Leu Ile Glu Asn Val Ser Ser Lys Leu His Ala His Ala Arg
                165                 170                 175

Asp His Pro Gln Glu Pro Val Asn Phe Arg Ala Ile Phe Glu His Glu
            180                 185                 190

Leu Phe Gly Val Ala Leu Lys Gln Ala Phe Gly Lys Asp Val Glu Ser
        195                 200                 205

Ile Tyr Val Lys Glu Leu Gly Val Thr Leu Ser Lys Asp Glu Ile Phe
    210                 215                 220

Lys Val Leu Val His Asp Met Met Glu Gly Ala Ile Asp Val Asp Trp
225                 230                 235                 240

Arg Asp Phe Phe Pro Tyr Leu Lys Trp Ile Pro Asn Lys Ser Phe Glu
                245                 250                 255

Ala Arg Ile Gln Gln Lys His Lys Arg Arg Leu Ala Val Met Asn Ala
            260                 265                 270

Leu Ile Gln Asp Arg Leu Lys Gln Asn Gly Ser Glu Ser Asp Asp Asp
        275                 280                 285

Cys Tyr Leu Asn Phe Leu Met Ser Glu Ala Lys Thr Leu Thr Lys Glu
    290                 295                 300

Gln Ile Ala Ile Leu Val Trp Glu Thr Ile Ile Glu Thr Ala Asp Thr
305                 310                 315                 320

Thr Leu Val Thr Thr Glu Trp Ala Ile Tyr Glu Leu Ala Lys His Pro
                325                 330                 335

Ser Val Gln Asp Arg Leu Cys Lys Glu Ile Gln Asn Val Cys Gly Gly
            340                 345                 350

Glu Lys Phe Lys Glu Glu Gln Leu Ser Gln Val Pro Tyr Leu Asn Gly
        355                 360                 365

Val Phe His Glu Thr Leu Arg Lys Tyr Ser Pro Ala Pro Leu Val Pro
    370                 375                 380
```

```
Ile Arg Tyr Ala His Glu Asp Thr Gln Ile Gly Gly Tyr His Val Pro
385                 390                 395                 400


Ala Gly Ser Glu Ile Ala Ile Asn Ile Tyr Gly Cys Asn Met Asp Lys
                405                 410                 415


Lys Arg Trp Glu Arg Pro Glu Asp Trp Trp Pro Glu Arg Phe Leu Asp
            420                 425                 430


Asp Gly Lys Tyr Glu Thr Ser Asp Leu His Lys Thr Met Ala Phe Gly
        435                 440                 445


Ala Gly Lys Arg Val Cys Ala Gly Ala Leu Gln Ala Ser Leu Met Ala
    450                 455                 460


Gly Ile Ala Ile Gly Arg Leu Val Gln Glu Phe Glu Trp Lys Leu Arg
465                 470                 475                 480


Asp Gly Glu Glu Glu Asn Val Asp Thr Tyr Gly Leu Thr Ser Gln Lys
                485                 490                 495


Leu Tyr Pro Leu Met Ala Ile Ile Asn Pro Arg Arg Ser
            500                 505


<210>  35
<211>  513
<212>  PRT
<213>  Arabidopsis thaliana

<400>  35

Met Ala Leu Leu Leu Ala Val Phe Ser Met Ile Ser Ile Leu Leu Gly
1               5                   10                  15


Phe Val Ile Ser Ser Phe Ile Phe Ile Phe Phe Phe Lys Lys Leu Leu
            20                  25                  30


Ser Phe Ser Arg Lys Asn Met Ser Glu Val Ser Thr Leu Pro Ser Val
        35                  40                  45


Pro Val Val Pro Gly Phe Pro Val Ile Gly Asn Leu Leu Gln Leu Lys
```

```
    50                  55                  60

Glu Lys Lys Pro His Lys Thr Phe Thr Arg Trp Ser Glu Ile Tyr Gly
65                  70                  75                  80

Pro Ile Tyr Ser Ile Lys Met Gly Ser Ser Ser Leu Ile Val Leu Asn
                85                  90                  95

Ser Thr Glu Thr Ala Lys Glu Ala Met Val Thr Arg Phe Ser Ser Ile
            100                 105                 110

Ser Thr Arg Lys Leu Ser Asn Ala Leu Thr Val Leu Thr Cys Asp Lys
        115                 120                 125

Ser Met Val Ala Thr Ser Asp Tyr Asp Asp Phe His Lys Leu Val Lys
    130                 135                 140

Arg Cys Leu Leu Asn Gly Leu Leu Gly Ala Asn Ala Gln Lys Arg Lys
145                 150                 155                 160

Arg His Tyr Arg Asp Ala Leu Ile Glu Asn Val Ser Ser Lys Leu His
                165                 170                 175

Ala His Ala Arg Asp His Pro Gln Glu Pro Val Asn Phe Arg Ala Ile
            180                 185                 190

Phe Glu His Glu Leu Phe Gly Val Ala Leu Lys Gln Ala Phe Gly Lys
        195                 200                 205

Asp Val Glu Ser Ile Tyr Val Lys Glu Leu Gly Val Thr Leu Ser Lys
    210                 215                 220

Asp Glu Ile Phe Lys Val Leu Val His Asp Met Met Glu Gly Ala Ile
225                 230                 235                 240

Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp Ile Pro Asn
                245                 250                 255

Lys Ser Phe Glu Ala Arg Ile Gln Gln Lys His Lys Arg Arg Leu Ala
            260                 265                 270
```

```
Val Met Asn Ala Leu Ile Gln Asp Arg Leu Lys Gln Asn Gly Ser Glu
        275                 280                 285

Ser Asp Asp Asp Cys Tyr Leu Asn Phe Leu Met Ser Glu Ala Lys Thr
    290                 295                 300

Leu Thr Lys Glu Gln Ile Ala Ile Leu Val Trp Glu Thr Ile Ile Glu
305                 310                 315                 320

Thr Ala Asp Thr Thr Leu Val Thr Thr Glu Trp Ala Ile Tyr Glu Leu
                325                 330                 335

Ala Lys His Pro Ser Val Gln Asp Arg Leu Cys Lys Glu Ile Gln Asn
            340                 345                 350

Val Cys Gly Gly Glu Lys Phe Lys Glu Glu Gln Leu Ser Gln Val Pro
        355                 360                 365

Tyr Leu Asn Gly Val Phe His Glu Thr Leu Arg Lys Tyr Ser Pro Ala
    370                 375                 380

Pro Leu Val Pro Ile Arg Tyr Ala His Glu Asp Thr Gln Ile Gly Gly
385                 390                 395                 400

Tyr His Val Pro Ala Gly Ser Glu Ile Ala Ile Asn Ile Tyr Gly Cys
                405                 410                 415

Asn Met Asp Lys Lys Arg Trp Glu Arg Pro Glu Asp Trp Trp Pro Glu
            420                 425                 430

Arg Phe Leu Asp Asp Gly Lys Tyr Glu Thr Ser Asp Leu His Lys Thr
        435                 440                 445

Met Ala Phe Gly Ala Gly Lys Arg Val Cys Ala Gly Ala Leu Gln Ala
    450                 455                 460

Ser Leu Met Ala Gly Ile Ala Ile Gly Arg Leu Val Gln Glu Phe Glu
465                 470                 475                 480

Trp Lys Leu Arg Asp Gly Glu Glu Glu Asn Val Asp Thr Tyr Gly Leu
```

485 490 495

Thr Ser Gln Lys Leu Tyr Pro Leu Met Ala Ile Ile Asn Pro Arg Arg
500 505 510

Ser

<210> 36
<211> 1539
<212> DNA
<213> Arabidopsis thaliana

<400> 36
atggctctgt tattagcagt tttttcgatg atttctatcc tgctgggctt tgttatctcg 60

tcctttatct ttatcttctt cttcaaaaaa ctgctgtcgt tttctcgtaa aaacatgtcc 120

gaagtttcaa ccctgccgag tgtcccggtg gttccgggtt ttccggttat cggtaatctg 180

ctgcagctga aagaaaagaa accgcataag accttcacgc gctggtccga aatctatggc 240

ccgatctact caattaaaat gggtagctct agtctgattg tgctgaactc taccgaaacg 300

gcaaaagaag ctatggttac ccgtttttcc tcaatttcga cgcgcaagct gagcaatgcg 360

ctgaccgtcc tgacgtgcga caaatctatg gtggccacca gtgattacga tgacttccat 420

aaactggtta agcgttgtct gctgaacggc ctgctgggtg cgaatgccca gaagcgtaag 480

cgccactatc gcgacgccct gattgaaaac gtgtcgagca aactgcatgc acacgctcgt 540

gatcatccgc aggaaccggt caattttcgc gcaatcttcg aacacgaact gtttggcgtg 600

gcgctgaaac aagccttcgg caaggatgtt gaatcgattt acgtcaaaga actgggcgtg 660

accctgagca aagacgaaat ctttaaggtc ctggtgcatg atatgatgga aggtgcaatt 720

gacgttgatt ggcgtgattt ctttccgtat ctgaaatgga ttccgaacaa gtcattcgaa 780

gctcgcattc agcaaaaaca caagcgtcgc ctggcagtga tgaacgctct gattcaggat 840

cgtctgaaac aaaatggctc tgaaagtgat gacgattgct atctgaattt tctgatgtcc 900

gaagcaaaaa ccctgacgaa ggaacagatt gctatcctgg tttgggaaac cattatcgaa 960

acggcggaca ccacgctggt caccacggaa tgggcgatct acgaactggc caagcatccg 1020

agcgttcagg atcgcctgtg caaagaaatt caaaacgtct gtggcggtga aaaatttaag 1080

gaagaacagc tgtcgcaagt gccgtatctg aatggtgttt tccacgaaac cctgcgtaaa 1140

tatagcccgg caccgctggt cccgatccgt tacgcccatg aagataccca gattggcggt 1200

tatcacgtgc cggcaggcag tgaaattgct atcaacattt acggttgcaa tatggacaaa 1260

aagcgttggg aacgcccgga agattggtgg ccggaacgtt ttctggacga tggcaaatat 1320

gaaacctctg atctgcataa gacgatggcg ttcggtgcag gtaaacgtgt gtgtgcaggt 1380

gcactgcaag caagtctgat ggcaggcatc gctattggtc gtctggtgca agaatttgaa 1440

tggaaactgc gcgacggcga agaagaaaac gttgatacct atggtctgac gtcccagaaa 1500

ctgtacccgc tgatggccat tatcaatccg cgtcgctca 1539

<210> 37
<211> 513
<212> PRT
<213> Stevia rebaudiana

<400> 37

Met Asp Ala Val Thr Gly Leu Leu Thr Val Pro Ala Thr Ala Ile Thr
1 5 10 15

Ile Gly Gly Thr Ala Val Ala Leu Ala Val Ala Leu Ile Phe Trp Tyr
20 25 30

Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser Asn His Leu Pro
35 40 45

Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly Asn Leu Leu Gln
50 55 60

Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg Trp Ala Ala Thr
65 70 75 80

Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr Ser Met Val Val
85 90 95

Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val Thr Arg Phe Gln
100 105 110

Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys Val Leu Thr Ala
115 120 125

```
Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp Tyr His Lys Thr
    130                 135                 140

Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro Asn Ala Gln Lys
145                 150                 155                 160

Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn Ile Ser Thr Gln
                165                 170                 175

Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu Glu Val Asp Leu
            180                 185                 190

Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala Met Arg Gln Ala
        195                 200                 205

Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp Leu Lys Ile Thr
    210                 215                 220

Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val Asp Pro Met Met
225                 230                 235                 240

Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp
                245                 250                 255

Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln Met Tyr Ile Arg
            260                 265                 270

Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His Lys Lys Arg Ile
        275                 280                 285

Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr Leu Leu Ser Glu
    290                 295                 300

Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser Leu Trp Glu Pro
305                 310                 315                 320

Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met
                325                 330                 335

Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg Leu Tyr Arg Asp
```

```
            340                 345                 350

Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu Glu His Leu Ser
        355                 360                 365

Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr Leu Arg Arg His
    370                 375                 380

Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His Glu Asp Thr Val
385                 390                 395                 400

Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu Ala Val Asn Ile
                405                 410                 415

Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn Pro Glu Glu Trp
            420                 425                 430

Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile Asp Phe Gln Lys
        435                 440                 445

Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala Gly Ser Leu Gln
    450                 455                 460

Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met Val Gln Glu Phe
465                 470                 475                 480

Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val Asn Thr Ile Gly
                485                 490                 495

Leu Thr Thr Gln Met Leu Arg Pro Leu Arg Ala Ile Ile Lys Pro Arg
            500                 505                 510

Ile
```

<210> 38
<211> 501
<212> PRT
<213> Stevia rebaudiana

<400> 38

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Met Ala Leu Leu Leu Ala Val Phe Ala Val Ala Leu Ala Val Ala Leu
1               5                  10                  15

Ile Phe Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser
            20                  25                  30

Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly
        35                  40                  45

Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg
    50                  55                  60

Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr
65                  70                  75                  80

Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val
                85                  90                  95

Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys
            100                 105                 110

Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp
        115                 120                 125

Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro
    130                 135                 140

Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn
145                 150                 155                 160

Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu
                165                 170                 175

Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala
            180                 185                 190

Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp
        195                 200                 205

Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val
    210                 215                 220
```

```
Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro
225                 230                 235                 240

Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln
                245                 250                 255

Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His
            260                 265                 270

Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr
        275                 280                 285

Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser
    290                 295                 300

Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr
305                 310                 315                 320

Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg
                325                 330                 335

Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu
            340                 345                 350

Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr
        355                 360                 365

Leu Arg Arg His Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His
    370                 375                 380

Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu
385                 390                 395                 400

Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn
                405                 410                 415

Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile
            420                 425                 430
```

Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala
435 440 445

Gly Ser Leu Gln Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met
450 455 460

Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val
465 470 475 480

Asn Thr Ile Gly Leu Thr Thr Gln Met Leu Arg Pro Leu Arg Ala Ile
485 490 495

Ile Lys Pro Arg Ile
500

<210> 39
<211> 1503
<212> DNA
<213> Stevia rebaudiana

<400> 39
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ctgaaatctt acactagcgc gcgccgctct cagtccaacc acctgccgcg tgtgccggaa 120

gttccgggtg tgccactgct gggcaacctg ctgcaactga aagaaaagaa accgtacatg 180

acctttaccc gctgggcagc gacttatggt cctatctaca gcattaaaac cggcgctacg 240

tctatggttg tggtttcttc caacgaaatc gcgaaagaag ccctggtgac tcgtttccag 300

tccattagca cccgcaacct gtccaaagcg ctgaaggttc tgacggctga caagactatg 360

gtggctatga gcgactatga tgactaccac aaaaccgtta aacgtcacat cctgaccgca 420

gtactgggtc cgaacgcaca gaaaaaacat cgcatccacc gcgacattat gatggataac 480

atctccacgc agctgcatga gttcgttaag aacaatccag aacaggaaga ggtagatctg 540

cgtaaaattt ttcagtccga actgttcggt ctggctatgc gtcaggcgct gggcaaagac 600

gttgaaagcc tgtatgtcga agacctgaaa attaccatga accgtgatga gatcttccag 660

gttctggttg tagatccgat gatgggcgcc atcgacgtgg attggcgtga cttctttccg 720

tacctgaaat gggtcccgaa caagaagttc gaaaacacca tccagcaaat gtacatccgt 780

cgtgaagcgg tgatgaaaag cctgatcaaa gaacacaaaa agcgtattgc ttctggtgag 840

aaactgaact cctacatcga ttatctgctg tccgaagcgc agaccctgac cgaccaacag 900

ctgctgatgt ctctgtggga accgattatc gaaagcagcg acaccactat ggtcactacc 960

gaatgggcaa tgtatgagct ggccaaaaac ccgaaactgc aggatcgtct gtaccgtgac 1020

atcaaaagcg tttgcggctc cgagaaaatc actgaagaac acctgtctca gctgccgtac 1080

atcactgcta ttttccacga aaccctgcgt cgccattctc cggttccgat cattccgctg 1140

cgtcacgttc acgaagatac tgtgctgggt ggttaccatg taccggcagg cactgaactg 1200

gctgtcaaca tctacggctg taacatggat aaaaacgttt gggagaatcc tgaagaatgg 1260

aacccggaac gcttcatgaa agagaacgaa accatcgact tccagaaaac gatggctttc 1320

ggcggtggta aacgtgtgtg cgcaggttct ctgcaggcgc tgctgacggc gtccattggt 1380

atcggtcgca tggtacagga atttgaatgg aagctgaaag acatgaccca agaagaggtg 1440

aataccattg gtctgactac ccagatgctg cgtccactgc gtgcaatcat caaacctcgt 1500

att 1503

<210> 40
<211> 546
<212> PRT
<213> Physcomitrella patens

<400> 40

Met Ala Lys His Leu Ala Thr Gln Leu Leu Gln Gln Trp Asn Glu Ala
1 5 10 15

Leu Lys Thr Met Pro Pro Gly Phe Arg Thr Ala Gly Lys Ile Leu Val
20 25 30

Trp Glu Glu Leu Ala Ser Asn Lys Val Leu Ile Thr Ile Ala Leu Ala
35 40 45

Trp Val Leu Leu Phe Val Ala Arg Thr Cys Leu Arg Asn Lys Lys Arg
50 55 60

Leu Pro Pro Ala Ile Pro Gly Gly Leu Pro Val Leu Gly Asn Leu Leu
65 70 75 80

Gln Leu Thr Glu Lys Lys Pro His Arg Thr Phe Thr Ala Trp Ser Lys
85 90 95

```
Glu His Gly Pro Ile Phe Thr Ile Lys Val Gly Ser Val Pro Gln Ala
            100                 105                 110

Val Val Asn Asn Ser Glu Ile Ala Lys Glu Val Leu Val Thr Lys Phe
        115                 120                 125

Ala Ser Ile Ser Lys Arg Gln Met Pro Met Ala Leu Arg Val Leu Thr
    130                 135                 140

Arg Asp Lys Thr Met Val Ala Met Ser Asp Tyr Gly Glu Glu His Arg
145                 150                 155                 160

Met Leu Lys Lys Leu Val Met Thr Asn Leu Leu Gly Pro Thr Thr Gln
                165                 170                 175

Asn Lys Asn Arg Ser Leu Arg Asp Asp Ala Leu Ile Gly Met Ile Glu
            180                 185                 190

Gly Val Leu Ala Glu Leu Lys Ala Ser Pro Thr Ser Pro Lys Val Val
        195                 200                 205

Asn Val Arg Asp Tyr Val Gln Arg Ser Leu Phe Pro Phe Ala Leu Gln
    210                 215                 220

Gln Val Phe Gly Tyr Ile Pro Asp Gln Val Glu Val Leu Glu Leu Gly
225                 230                 235                 240

Thr Cys Val Ser Thr Trp Asp Met Phe Asp Ala Leu Val Val Ala Pro
                245                 250                 255

Leu Ser Ala Val Ile Asn Val Asp Trp Arg Asp Phe Phe Pro Ala Leu
            260                 265                 270

Arg Trp Ile Pro Asn Arg Ser Val Glu Asp Leu Val Arg Thr Val Asp
        275                 280                 285

Phe Lys Arg Asn Ser Ile Met Lys Ala Leu Ile Arg Ala Gln Arg Met
    290                 295                 300
```

```
Arg Leu Ala Asn Leu Lys Glu Pro Pro Arg Cys Tyr Ala Asp Ile Ala
305                 310                 315                 320

Leu Thr Glu Ala Thr His Leu Thr Glu Lys Gln Leu Glu Met Ser Leu
                325                 330                 335

Trp Glu Pro Ile Ile Glu Ser Ala Asp Thr Thr Leu Val Thr Ser Glu
            340                 345                 350

Trp Ala Met Tyr Glu Ile Ala Lys Asn Pro Asp Cys Gln Asp Arg Leu
        355                 360                 365

Tyr Arg Glu Ile Val Ser Val Ala Gly Thr Glu Arg Met Val Thr Glu
    370                 375                 380

Asp Asp Leu Pro Asn Met Pro Tyr Leu Gly Ala Ile Ile Lys Glu Thr
385                 390                 395                 400

Leu Arg Lys Tyr Thr Pro Val Pro Leu Ile Pro Ser Arg Phe Val Glu
                405                 410                 415

Glu Asp Ile Thr Leu Gly Gly Tyr Asp Ile Pro Lys Gly Tyr Gln Ile
            420                 425                 430

Leu Val Asn Leu Phe Ala Ile Ala Asn Asp Pro Ala Val Trp Ser Asn
        435                 440                 445

Pro Glu Lys Trp Asp Pro Glu Arg Met Leu Ala Asn Lys Lys Val Asp
    450                 455                 460

Met Gly Phe Arg Asp Phe Ser Leu Met Pro Phe Gly Ala Gly Lys Arg
465                 470                 475                 480

Met Cys Ala Gly Ile Thr Gln Ala Met Phe Ile Ile Pro Met Asn Val
                485                 490                 495

Ala Ala Leu Val Gln His Cys Glu Trp Arg Leu Ser Pro Gln Glu Ile
            500                 505                 510

Ser Asn Ile Asn Asn Lys Ile Glu Asp Val Val Tyr Leu Thr Thr His
        515                 520                 525
```

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Lys Leu Ser Pro Leu Ser Cys Glu Ala Thr Pro Arg Ile Ser His Arg
    530                 535                 540


Leu Pro
545


<210>  41
<211>  548
<212>  PRT
<213>  Physcomitrella patens

<400>  41

Met Ala Leu Leu Leu Ala Val Phe Thr Gln Leu Leu Gln Gln Trp Asn
1               5                   10                  15


Glu Ala Leu Lys Thr Met Pro Pro Gly Phe Arg Thr Ala Gly Lys Ile
            20                  25                  30


Leu Val Trp Glu Glu Leu Ala Ser Asn Lys Val Leu Ile Thr Ile Ala
        35                  40                  45


Leu Ala Trp Val Leu Leu Phe Val Ala Arg Thr Cys Leu Arg Asn Lys
    50                  55                  60


Lys Arg Leu Pro Pro Ala Ile Pro Gly Gly Leu Pro Val Leu Gly Asn
65                  70                  75                  80


Leu Leu Gln Leu Thr Glu Lys Lys Pro His Arg Thr Phe Thr Ala Trp
                85                  90                  95


Ser Lys Glu His Gly Pro Ile Phe Thr Ile Lys Val Gly Ser Val Pro
            100                 105                 110


Gln Ala Val Val Asn Asn Ser Glu Ile Ala Lys Glu Val Leu Val Thr
        115                 120                 125


Lys Phe Ala Ser Ile Ser Lys Arg Gln Met Pro Met Ala Leu Arg Val
    130                 135                 140


Leu Thr Arg Asp Lys Thr Met Val Ala Met Ser Asp Tyr Gly Glu Glu
```

```
145                 150                 155                 160

His Arg Met Leu Lys Lys Leu Val Met Thr Asn Leu Leu Gly Pro Thr
                165                 170                 175

Thr Gln Asn Lys Asn Arg Ser Leu Arg Asp Asp Ala Leu Ile Gly Met
            180                 185                 190

Ile Glu Gly Val Leu Ala Glu Leu Lys Ala Ser Pro Thr Ser Pro Lys
        195                 200                 205

Val Val Asn Val Arg Asp Tyr Val Gln Arg Ser Leu Phe Pro Phe Ala
    210                 215                 220

Leu Gln Gln Val Phe Gly Tyr Ile Pro Asp Gln Val Glu Val Leu Glu
225                 230                 235                 240

Leu Gly Thr Cys Val Ser Thr Trp Asp Met Phe Asp Ala Leu Val Val
                245                 250                 255

Ala Pro Leu Ser Ala Val Ile Asn Val Asp Trp Arg Asp Phe Phe Pro
            260                 265                 270

Ala Leu Arg Trp Ile Pro Asn Arg Ser Val Glu Asp Leu Val Arg Thr
        275                 280                 285

Val Asp Phe Lys Arg Asn Ser Ile Met Lys Ala Leu Ile Arg Ala Gln
    290                 295                 300

Arg Met Arg Leu Ala Asn Leu Lys Glu Pro Pro Arg Cys Tyr Ala Asp
305                 310                 315                 320

Ile Ala Leu Thr Glu Ala Thr His Leu Thr Glu Lys Gln Leu Glu Met
                325                 330                 335

Ser Leu Trp Glu Pro Ile Ile Glu Ser Ala Asp Thr Thr Leu Val Thr
            340                 345                 350

Ser Glu Trp Ala Met Tyr Glu Ile Ala Lys Asn Pro Asp Cys Gln Asp
        355                 360                 365
```

```
Arg Leu Tyr Arg Glu Ile Val Ser Val Ala Gly Thr Glu Arg Met Val
    370                 375                 380

Thr Glu Asp Asp Leu Pro Asn Met Pro Tyr Leu Gly Ala Ile Ile Lys
385                 390                 395                 400

Glu Thr Leu Arg Lys Tyr Thr Pro Val Pro Leu Ile Pro Ser Arg Phe
                405                 410                 415

Val Glu Glu Asp Ile Thr Leu Gly Gly Tyr Asp Ile Pro Lys Gly Tyr
            420                 425                 430

Gln Ile Leu Val Asn Leu Phe Ala Ile Ala Asn Asp Pro Ala Val Trp
        435                 440                 445

Ser Asn Pro Glu Lys Trp Asp Pro Glu Arg Met Leu Ala Asn Lys Lys
    450                 455                 460

Val Asp Met Gly Phe Arg Asp Phe Ser Leu Met Pro Phe Gly Ala Gly
465                 470                 475                 480

Lys Arg Met Cys Ala Gly Ile Thr Gln Ala Met Phe Ile Ile Pro Met
                485                 490                 495

Asn Val Ala Ala Leu Val Gln His Cys Glu Trp Arg Leu Ser Pro Gln
            500                 505                 510

Glu Ile Ser Asn Ile Asn Asn Lys Ile Glu Asp Val Val Tyr Leu Thr
        515                 520                 525

Thr His Lys Leu Ser Pro Leu Ser Cys Glu Ala Thr Pro Arg Ile Ser
    530                 535                 540

His Arg Leu Pro
545
```

<210> 42
<211> 1644
<212> DNA
<213> Physcomitrella patens

<400> 42
atggctctgt tattagcagt ttttacgcaa ctgctgcaac aatggaatga agctctgaag 60

acgatgccgc cgggttttcg caccgctggc aaaattctgg tgtgggaaga actggcaagc 120

aataaagttc tgattacgat cgcactggct tgggtcctgc tgtttgtggc tcgtacctgc 180

ctgcgcaata aaaagcgtct gccgccggca atcccgggcg gtctgccggt gctgggcaac 240

ctgctgcagc tgacggaaaa gaaaccgcat cgtaccttta cggcgtggag caaggaacac 300

ggcccgattt tcaccatcaa agtcggttcg gtgccgcagg ctgtggttaa caatagcgaa 360

attgcgaaag aagtcctggt gaccaagttc gccagcatct ctaaacgtca aatgccgatg 420

gcactgcgcg tcctgacgcg tgataaaacg atggtggcta tgtctgacta tggcgaagaa 480

catcgcatgc tgaaaaagct ggtgatgacg aatctgctgg gtccgaccac gcagaacaaa 540

aatcgtagtc tgcgcgatga cgcactgatt ggcatgatcg aaggtgttct ggcggaactg 600

aaggccagtc cgacctcccc gaaagtcgtg aacgttcgcg attatgtcca gcgttctctg 660

tttccgttcg cgctgcagca agtgtttggc tacattccgg atcaagttga agtcctggaa 720

ctgggcacgt gtgtttctac ctgggatatg ttcgacgcac tggttgtcgc tccgctgagt 780

gcggttatta acgtcgattg gcgtgacttt ttcccggccc tgcgctggat tccgaatcgt 840

tccgtggaag atctggtgcg caccgttgac tttaagcgta actcaattat gaaagccctg 900

atccgtgcac agcgtatgcg cctggctaac ctgaaggaac cgccgcgctg ctacgcagat 960

attgctctga ccgaagcgac gcacctgacc gaaaaacaac tggaaatgag tctgtgggaa 1020

ccgattatcg aatccgccga taccacgctg gtgacctcag aatgggctat gtatgaaatt 1080

gcgaaaaatc cggattgtca ggaccgtctg taccgcgaaa tcgtgtccgt tgccggcacg 1140

gaacgcatgg ttaccgaaga tgacctgccg aacatgccgt atctgggtgc aattatcaaa 1200

gaaacgctgc gcaagtacac cccggttccg ctgattccga gtcgttttgt cgaagaagat 1260

atcaccctgg gcggttatga cattccgaaa ggttaccaga tcctggtcaa cctgttcgcg 1320

attgccaatg atccggccgt ttggtcgaac ccggaaaaat gggacccgga acgcatgctg 1380

gcaaataaaa aggtggatat gggctttcgt gacttcagcc tgatgccgtt tggcgccggt 1440

aaacgcatgt gcgccggtat cacccaagca atgttcatta tcccgatgaa tgtggcggcc 1500

ctggttcagc attgtgaatg gcgcctgagc ccgcaagaaa tctctaacat caacaacaag 1560

atcgaagatg tggtttacct gaccacgcat aaactgtcac cgctgtcgtg cgaagcaacc 1620

ccgcgtatca gccaccgtct gccg 1644

<210> 43
<211> 1049
<212> PRT
<213> Bacillus megaterium

<400> 43

Met Thr Ile Lys Glu Met Pro Gln Pro Lys Thr Phe Gly Glu Leu Lys
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Asn Leu Pro Leu Leu Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys
20 25 30

Ile Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg
35 40 45

Val Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp
50 55 60

Glu Ser Arg Phe Asp Lys Asn Leu Ser Gln Ala Leu Lys Phe Val Arg
65 70 75 80

Asp Phe Ala Gly Asp Gly Leu Ala Thr Ser Trp Thr His Glu Lys Asn
85 90 95

Trp Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala
100 105 110

Met Lys Gly Tyr His Ala Met Met Val Asp Ile Ala Val Gln Leu Val
115 120 125

Gln Lys Trp Glu Arg Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu
130 135 140

Asp Met Thr Arg Leu Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn
145 150 155 160

Tyr Arg Phe Asn Ser Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr
165 170 175

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Ser Met Val Arg Ala Leu Asp Glu Ala Met Asn Lys Leu Gln Arg Ala
            180                 185                 190

Asn Pro Asp Asp Pro Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu
        195                 200                 205

Asp Ile Lys Val Met Asn Asp Leu Val Asp Lys Ile Ile Ala Asp Arg
    210                 215                 220

Lys Ala Ser Gly Glu Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn
225                 230                 235                 240

Gly Lys Asp Pro Glu Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg
                245                 250                 255

Tyr Gln Ile Ile Thr Phe Leu Ile Ala Gly His Glu Thr Thr Ser Gly
            260                 265                 270

Leu Leu Ser Phe Ala Leu Tyr Phe Leu Val Lys Asn Pro His Val Leu
        275                 280                 285

Gln Lys Ala Ala Glu Glu Ala Ala Arg Val Leu Val Asp Pro Val Pro
    290                 295                 300

Ser Tyr Lys Gln Val Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn
305                 310                 315                 320

Glu Ala Leu Arg Leu Trp Pro Thr Ile Pro Ala Phe Ser Leu Tyr Ala
                325                 330                 335

Lys Glu Asp Thr Val Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp
            340                 345                 350

Glu Leu Met Val Leu Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp
        355                 360                 365

Gly Asp Asp Val Glu Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser
    370                 375                 380

Ala Ile Pro Gln His Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala
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385                 390                 395                 400

Cys Ile Gly Gln Gln Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly
                405                 410                 415

Met Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu
            420                 425                 430

Asp Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys
        435                 440                 445

Ala Lys Ser Lys Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr
    450                 455                 460

Glu Gln Ser Ala Lys Lys Val Arg Lys Lys Ala Glu Asn Ala His Asn
465                 470                 475                 480

Thr Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly
                485                 490                 495

Thr Ala Arg Asp Leu Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro
            500                 505                 510

Gln Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly
        515                 520                 525

Ala Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn
    530                 535                 540

Ala Lys Gln Phe Val Asp Trp Leu Asp Gln Ala Ser Ala Asp Glu Val
545                 550                 555                 560

Lys Gly Val Arg Tyr Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala
                565                 570                 575

Thr Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala
            580                 585                 590

Lys Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp
        595                 600                 605
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Asp Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp
    610                 615                 620

Val Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys
625                 630                 635                 640

Ser Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu
                645                 650                 655

Ala Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu
            660                 665                 670

Leu Gln Gln Pro Gly Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu
        675                 680                 685

Leu Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile
    690                 695                 700

Pro Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly
705                 710                 715                 720

Leu Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Glu Lys Leu
                725                 730                 735

Ala His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln
            740                 745                 750

Tyr Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met
        755                 760                 765

Ala Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu
    770                 775                 780

Leu Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr
785                 790                 795                 800

Met Leu Glu Leu Leu Glu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser
                805                 810                 815

Glu Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile
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            820                 825                 830

Ser Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser
        835                 840                 845

Val Val Ser Gly Glu Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile
    850                 855                 860

Ala Ser Asn Tyr Leu Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys
865                 870                 875                 880

Phe Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu
                885                 890                 895

Thr Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg
            900                 905                 910

Gly Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu
        915                 920                 925

Gly Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr
    930                 935                 940

Leu Tyr Gln Glu Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr
945                 950                 955                 960

Leu His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val
                965                 970                 975

Gln His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp
            980                 985                 990

Gln Gly Ala His Phe Tyr Ile Cys  Gly Asp Gly Ser Gln  Met Ala Pro
        995                 1000                1005

Ala Val  Glu Ala Thr Leu Met  Lys Ser Tyr Ala Asp  Val His Gln
    1010                1015                1020

Val Ser  Glu Ala Asp Ala Arg  Leu Trp Leu Gln Gln  Leu Glu Glu
    1025                1030                1035
```

Lys Gly Arg Tyr Ala Lys Asp Val Trp Ala Gly
    1040   1045

<210> 44
<211> 3150
<212> DNA
<213> Bacillus megaterium

<400> 44
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ctgaacacgg ataagccggt gcaagccctg atgaagattg ctgatgaact gggcgaaatc 120

tttaaattcg aagcgccggg tcgtgtgacc cgttatctga gcagccagcg tctgattaaa 180

gaagcctgcg atgaatcgcg ctttgacaag aacctgagcc aggcactgaa atttgttcgt 240

gatttcgcag gtgacggtct ggccaccagc tggacgcatg aaaagaactg gaaaaaggcc 300

cacaatattc tgctgccgtc gttcagccag caagcaatga aaggctacca tgctatgatg 360

gtcgatatcg cggttcagct ggtccaaaaa tgggaacgtc tgaatgcgga cgaacacatt 420

gaagtgccgg aagatatgac ccgcctgacg ctggacacca tcggtctgtg tggctttaac 480

tatcgtttta attcgttcta ccgcgatcag ccgcatccgt tcattaccag catggtgcgt 540

gcgctggacg aagccatgaa caaactgcag cgtgcaaacc cggatgaccc ggcgtatgat 600

gaaaacaagc gtcagtttca agaagacatc aaagtgatga atgatctggt tgacaagatt 660

atcgcagatc gcaaagcgag cggcgaacag tcagatgacc tgctgacgca catgctgaac 720

ggcaaagacc cggaaaccgg tgaaccgctg gatgacgaaa acatccgtta tcagatcatc 780

acctttctga tcgcaggcca tgaaaccacg tcgggtctgc tgagctttgc gctgtacttc 840

ctggtcaaga acccgcacgt gctgcagaaa gcggccgaag aagcagctcg tgtgctggtt 900

gatccggttc cgtcgtataa acaggtcaag caactgaaat acgtgggtat ggttctgaat 960

gaagcgctgc gcctgtggcc gacgattccg gcatttagcc tgtatgctaa ggaagatacc 1020

gttctgggcg gtgaataccc gctggaaaaa ggcgatgaac tgatggtcct gattccgcag 1080

ctgcatcgcg acaaaaccat ctggggtgat gacgtggaag aatttcgccc ggaacgcttc 1140

gaaaacccga gcgcgattcc gcagcatgcc tttaaaccgt tcggcaatgg tcaacgtgcg 1200

tgcatcggcc agcaatttgc gctgcacgaa gccacgctgg ttctgggtat gatgctgaaa 1260

cattttgatt tcgaagacca caccaactat gaactggata ttaaggaaac cctgacgctg 1320

aaaccggaag gcttcgtggt taaagcgaag tctaaaaaga ttccgctggg cggtatcccg 1380

tctccgagta cggaacagag tgccaaaaag gtccgtaaaa aggcggaaaa cgcccataat 1440

accccgctgc tggtgctgta tggttctaac atgggcacgg cagaaggcac cgctcgcgat 1500

ctggcagaca ttgctatgtc taaaggtttt gcgccgcagg tggccacgct ggatagtcat 1560

gcaggcaatc tgccgcgtga aggtgctgtc ctgatcgtga ccgcaagcta caacggtcac 1620

ccgccggata atgcgaagca gttcgttgat tggctggacc aagcgtcggc cgatgaagtt 1680

aaaggtgtcc gctatagcgt gtttggctgt ggtgacaaga actgggctac cacgtaccag 1740

aaagttccgg cgttcattga tgaaacgctg gcggccaaag gcgcagaaaa tatcgctgat 1800

cgtggtgaag cagacgcttc cgatgacttt gaaggcacct atgaagaatg gcgcgaacac 1860

atgtggtcgg atgtggcagc ttacttcaac ctggatattg aaaacagcga agacaataaa 1920

tccaccctgt cactgcagtt tgttgatagt gcggccgaca tgccgctggc aaagatgcac 1980

ggcgctttct ccacgaatgt cgtggcttca aaagaactgc agcaaccggg ttcggcacgt 2040

agcacccgcc atctggaaat tgaactgccg aaagaagcca gctatcagga aggcgatcac 2100

ctgggtgtga ttccgcgtaa ctacgaaggc atcgtgaatc gtgttacggc ccgctttggt 2160

ctggatgcat cccagcaaat ccgcctggaa gcggaagaag aaaagctggc gcatctgccg 2220

ctggccaaaa ccgtctcagt ggaagaactg ctgcagtatg tggaactgca agatccggtt 2280

acccgtacgc agctgcgtgc gatggcggct aagaccgtct gcccgccgca caaagtggaa 2340

ctggaagctc tgctggaaaa gcaggcgtat aaagaacaag tgctggcgaa acgcctgacc 2400

atgctggaac tgctggaaaa gtacccggcc tgtgaaatga agttctctga atttatcgca 2460

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aaacaggcca gtatcaccgt ttctgttgtc agtggcgaag catggtctgg ctatggtgaa 2580

tacaagggta tcgcaagtaa ctacctggct gaactgcagg aaggcgatac cattacgtgc 2640

tttatctcta cgccgcaaag tgaatttacc ctgccgaaag acccggaaac gccgctgatc 2700

atggttggcc cgggcaccgg tgtcgcaccg tttcgtggtt tcgtgcaggc acgcaagcaa 2760

ctgaaagaac agggccaatc cctgggtgaa gcgcatctgt attttggctg tcgctcaccg 2820

cacgaagatt atctgtacca ggaagaactg gaaaacgcgc aatccgaagg tattatcacg 2880

ctgcataccg ccttctcacg tatgccgaat cagccgaaaa cctacgtcca gcacgtgatg 2940

gaacaagatg gcaaaaagct gattgaactg ctggaccagg gtgcgcattt ttatatctgc 3000

ggtgatggca gccaaatggc accggcagtg gaagcaaccc tgatgaaatc ctacgcagat 3060

gttcaccagg tctcagaagc agacgctcgt ctgtggctgc agcaactgga agaaaagggc 3120

cgctatgcga aagatgtttg ggccggttaa 3150

<210> 45
<211> 396
<212> PRT
<213> Pleurotus sapidus

<400> 45

Met Arg Tyr Gly Cys Ala Ala Val Ala Leu Phe Tyr Leu Thr Ala Met
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Gly Lys Leu His Pro Leu Ala Ile Ile Pro Asp Tyr Lys Gly Ser Met
20 25 30

Ala Ala Ser Val Thr Ile Phe Asn Lys Arg Thr Asn Pro Leu Asp Ile
35 40 45

Ser Val Asn Gln Ala Asn Asp Trp Pro Trp Arg Tyr Ala Lys Thr Cys
50 55 60

Val Leu Ser Ser Asp Trp Ala Leu His Glu Met Ile Ile His Leu Asn
65 70 75 80

Asn Thr His Leu Val Glu Glu Ala Val Ile Val Ala Ala Gln Arg Lys
85 90 95

Leu Ser Pro Ser His Ile Val Phe Arg Leu Leu Glu Pro His Trp Val
100 105 110

Val Thr Leu Ser Leu Asn Ala Leu Ala Arg Ser Val Leu Ile Pro Glu
115 120 125

Val Ile Val Pro Ile Ala Gly Phe Ser Ala Pro His Ile Phe Gln Phe
130 135 140

Ile Arg Glu Ser Phe Thr Asn Phe Asp Trp Lys Ser Leu Tyr Val Pro

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145                 150                 155                 160

Ala Asp Leu Glu Ser Arg Gly Phe Pro Val Asp Gln Leu Asn Ser Pro
                165                 170                 175

Lys Phe His Asn Tyr Ala Tyr Ala Arg Asp Ile Asn Asp Met Trp Thr
            180                 185                 190

Thr Leu Lys Lys Phe Val Ser Ser Val Leu Gln Asp Ala Gln Tyr Tyr
        195                 200                 205

Pro Asp Asp Ala Ser Val Ala Gly Asp Thr Gln Ile Gln Ala Trp Cys
    210                 215                 220

Asp Glu Met Arg Ser Gly Met Gly Ala Gly Met Thr Asn Phe Pro Glu
225                 230                 235                 240

Ser Ile Thr Thr Val Asp Asp Leu Val Asn Met Val Thr Met Cys Ile
                245                 250                 255

His Ile Ala Ala Pro Gln His Thr Ala Val Asn Tyr Leu Gln Gln Tyr
            260                 265                 270

Tyr Gln Thr Phe Val Ser Asn Lys Pro Ser Ala Leu Phe Ser Pro Leu
        275                 280                 285

Pro Thr Ser Ile Ala Gln Leu Gln Lys Tyr Thr Glu Ser Asp Leu Met
    290                 295                 300

Ala Ala Leu Pro Leu Asn Ala Lys Arg Gln Trp Leu Leu Met Ala Gln
305                 310                 315                 320

Ile Pro Tyr Leu Leu Ser Met Gln Val Gln Glu Asp Glu Asn Ile Val
                325                 330                 335

Thr Tyr Ala Ala Asn Ala Ser Thr Asp Lys Asp Pro Ile Ile Ala Ser
            340                 345                 350

Ala Gly Arg Gln Leu Ala Ala Asp Leu Lys Lys Leu Ala Ala Val Phe
        355                 360                 365
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Leu Val Asn Ser Ala Gln Leu Asp Asp Gln Asn Thr Pro Tyr Asp Val
370 375 380

Leu Ala Pro Glu Gln Leu Ala Asn Ala Ile Val Ile
385 390 395

<210> 46
<211> 1191
<212> DNA
<213> Pleurotus sapidus

<400> 46
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ccgctggcta ttatcccgga ctacaagggt agcatggcgg cctctgtcac catttttaac 120

aaacgtacga atccgctgga tatcagcgtt aaccaggcaa atgactggcc gtggcgctat 180

gctaagacgt gcgtgctgag cagcgattgg gcgctgcatg aaatgattat ccacctgaac 240

aatacccatc tggtggaaga agccgtcatt gtggcagctc agcgtaaact gtcaccgtcg 300

cacatcgttt ttcgcctgct ggaaccgcat tgggtggtta ccctgtcgct gaacgcactg 360

gctcgtagcg tgctgatccc ggaagttatt gtcccgatcg cgggtttctc tgccccgcac 420

atttttcagt tcatccgcga atcttttacc aatttcgatt ggaaaagtct gtacgtcccg 480

gcggacctgg aatcgcgtgg ctttccggtg gatcagctga acagcccgaa gttccataat 540

tatgcgtacg cccgcgatat caacgacatg tggaccacgc tgaaaaagtt tgtgagttcc 600

gttctgcagg atgcccaata ttacccggat gacgcaagtg tggctggtga tacgcagatt 660

caagcatggt gcgacgaaat gcgttccggc atgggtgcgg gcatgaccaa cttcccggaa 720

tcaatcacca cggttgatga cctggtcaat atggtgacca tgtgtattca catcgcggcc 780

ccgcagcata cggcggttaa ctatctgcag caatactacc aaaccttcgt cagtaacaag 840

ccgtccgcac tgttctcacc gctgccgacc tctattgctc agctgcaaaa atacacggaa 900

agtgatctga tggcagctct gccgctgaac gcgaagcgtc agtggctgct gatggcccaa 960

attccgtatc tgctgtcgat gcaggtgcaa gaagatgaaa acatcgttac ctacgcggcc 1020

aatgcgtcca cggataaaga cccgattatc gcatcagctg gccgccagct ggcagctgac 1080

ctgaaaaagc tggcggccgt ttttctggtc aactcagccc agctggatga ccaaaatacc 1140

ccgtatgatg tgctggcacc ggaacagctg gcgaatgcca ttgttatcta a 1191

<210> 47
<211> 640
<212> PRT
<213> Pleurotus ostreatus

<400> 47

Met Ala Pro Thr Met Ser Leu Ser Arg Ser Ala Leu Lys Asn Val His
1 5 10 15

Leu Pro Tyr Met Val Gln His Pro Glu Pro Thr Asp Cys Ser Thr Ala
20 25 30

Met Lys His Ala Ala Glu Gly Tyr Asp Arg Ala Arg Gln Met Ile Ala
35 40 45

Phe Leu Phe Asp Ile Leu Asp Tyr Glu Ser Ser Val Pro Gln Lys Phe
50 55 60

Thr Pro Glu Glu Lys Lys Glu Lys Tyr Thr Trp Ser His Ser Asp Lys
65 70 75 80

Phe Pro Pro His Leu Ala Ile Ile Pro Glu Asp Ile Asp Val Pro Ala
85 90 95

Tyr Ile Ile Phe Ser Ile Val Arg Leu Val Gln Thr Leu Ser Ile Met
100 105 110

Ser Gly Ile Gln Cys Asn Glu Arg Leu Ala Pro Gly Pro Glu Gln Asn
115 120 125

Thr Met Glu Lys Leu Thr Lys Trp Asn Ala Glu Arg His Lys Asn Gln
130 135 140

Gly Trp Val Lys Asp Met Phe Asn Glu Pro Asn Ile Gly Leu Arg Asn
145 150 155 160

Asp Trp Tyr Thr Asp Ala Val Phe Ala Gln Gln Phe Phe Thr Gly Pro
165 170 175

Asn Pro Thr Thr Ile Thr Leu Ala Ser Asp Thr Trp Met Lys Ala Phe

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            180                 185                 190

Thr Glu Glu Ala Ala Ser Gln Gly Lys Arg Asp Leu Ile Ser Leu Phe
        195                 200                 205

Arg Ser Ala Pro Pro Asn Ser Phe Tyr Val Gln Asp Phe Ser Asp Phe
    210                 215                 220

Arg Ala Arg Met Gly Ala Lys Pro Asp Glu Glu Leu Cys Ala Thr Ser
225                 230                 235                 240

Asp Gly Gly Val Thr Arg Tyr Gly Cys Ala Ala Val Ala Leu Phe Tyr
                245                 250                 255

Leu Pro Pro Thr Gly Glu Leu His Pro Leu Ala Ile Val Pro Asp Tyr
            260                 265                 270

Lys Gly Ser Met Ala Ala Ser Ile Thr Leu Phe Asn Lys Arg Val Asp
        275                 280                 285

Pro Ser Asp Ala Ser Val Asp Gln Ala Asn Asp Trp Pro Trp Arg Tyr
    290                 295                 300

Ala Lys Thr Cys Val Leu Ser Ala Asp Trp Val Leu His Glu Met Ile
305                 310                 315                 320

Ile His Leu Asn Asn Thr His Leu Val Gln Glu Ala Val Ile Val Ala
                325                 330                 335

Val Gln Arg Thr Leu Pro Asp Ser His Ile Val Phe Arg Leu Leu Lys
            340                 345                 350

Pro His Trp Val Val Thr Leu Ser Leu Asn Ala Gln Ala Arg Ser Val
        355                 360                 365

Leu Ile Pro Glu Val Ile Val Pro Ile Ala Gly Phe Ser Glu Leu Arg
    370                 375                 380

Ile Phe Gln Phe Val Gly His Ala Phe Thr Asn Phe Asp Trp Lys Ala
385                 390                 395                 400
```

```
Leu Tyr Val Pro Thr Asp Leu Glu Phe Arg Gly Phe Pro Leu Asp Arg
               405                 410                 415

Leu Asp Asp Asp Lys Phe His Asn Tyr Ala Tyr Ala Lys Asp Ile Lys
            420                 425                 430

Asp Met Trp Met Ala Leu Arg Lys Phe Val Ser Ser Val Leu Lys Asp
        435                 440                 445

Gly Lys Tyr Tyr Pro Asp Asp Ser Ala Val Ala Ala Asp Ala Gln Ile
    450                 455                 460

Gln Asp Trp Cys Asp Glu Met Arg Ser Glu Lys Gly Ala Gly Met Lys
465                 470                 475                 480

Lys Phe Pro Glu Ser Ile Ser Thr Leu Asp Asp Leu Ile Asp Met Val
               485                 490                 495

Thr Met Cys Ile His Ile Ala Ala Pro Gln His Thr Ala Val Asn Tyr
            500                 505                 510

Leu Gln Gln Tyr Tyr Gln Thr Phe Val Pro Asn Lys Pro Ser Ala Leu
        515                 520                 525

Phe Ser Pro Leu Pro Thr Leu Leu Ser Gln Leu Glu Ser Tyr Thr Glu
    530                 535                 540

Ser Asp Leu Met Ala Ala Leu Pro Leu Gly Ala Lys Gln Glu Trp Leu
545                 550                 555                 560

Leu Met Ala Gln Val Pro Tyr Leu Leu Ser Lys Glu Val Glu Gln Asp
               565                 570                 575

Gly Asn Ile Val Thr Tyr Ala Gly Thr Ala Ser Asn Asn Glu Asp Pro
            580                 585                 590

Ile Ile Ala Ala Ala Gly Lys Glu Leu Ser Ala Asp Leu Val Ile Leu
        595                 600                 605

Ala Gly Val Phe Leu Lys Asn Ser Glu Lys Leu Asp Asp Gln Asn Thr
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610 615 620

Ala Tyr Asn Val Leu Ala Pro Asp Gln Leu Ala Asn Ala Ile Val Ile
625 630 635 640

<210> 48
<211> 1923
<212> DNA
<213> Pleurotus ostreatus

<400> 48
atggccccga cgatgtcact gtctcgctcc gcactgaaga atgtccacct gccgtatatg 60

gtccaacacc cggaaccgac cgattgcagc accgcgatga aacacgcggc cgaaggttat 120

gatcgtgctc gccagatgat tgcgtttctg ttcgacatcc tggattacga aagctctgtt 180

ccgcaaaaat ttaccccgga agaaaagaaa gaaaaatata cgtggtcaca ctcggataag 240

ttcccgccgc atctggccat tatcccggaa gacattgatg tgccggcata cattatcttt 300

agcatcgttc gtctggtcca gaccctgagt attatgtccg gcatccaatg caacgaacgt 360

ctggcaccgg ggccggaaca gaatacgatg gaaaaactga cgaagtggaa cgcggaacgt 420

cataaaaatc aaggctgggt caaggatatg tttaacgaac cgaatattgg tctgcgcaac 480

gactggtata ccgatgctgt gttcgcgcag caatttttca cgggtccgaa tccgaccacg 540

attaccctgg cctctgatac gtggatgaaa gcatttaccg aagaagcagc tagtcagggc 600

aagcgtgacc tgatcagcct gtttcgctct gccccgccga actccttcta cgttcaggac 660

ttttcagatt tccgtgctcg catgggcgcg aaaccggacg aagaactgtg cgcgacctct 720

gatggcggtg ttacccgtta tggctgtgca gcagtcgcac tgttttacct gccgccgacc 780

ggtgaactgc atccgctggc cattgtgccg gattataaag gcagtatggc agcttccatc 840

acgctgttca acaagcgtgt ggacccgtca gatgcctcgg ttgaccaggc aaatgattgg 900

ccgtggcgct acgctaaaac ctgtgttctg tccgcggatt gggtcctgca tgaaatgatt 960

atccacctga acaataccca tctggtgcag gaagccgtca ttgtggcagt tcaacgtacg 1020

ctgccggatt cacacatcgt ttttcgcctg ctgaaaccgc attgggtggt taccctgtcg 1080

ctgaatgccc aggcacgtag cgttctgatc ccggaagtca ttgtgccgat cgcgggcttc 1140

agtgaactgc gcatctttca gttcgttggt cacgccttta ccaacttcga ctggaaagca 1200

ctgtatgtcc cgacggatct ggaatttcgt ggtttcccgc tggaccgcct ggatgacgat 1260

aagttccata actatgctta cgcgaaggac attaaggata tgtggatggc cctgcgtaag 1320

ttcgtgagtt ccgttctgaa agatggcaag tattacccgg acgattcggc tgttgcagca 1380

gacgcgcaga ttcaagactg gtgcgatgaa atgcgcagcg aaaaaggcgc gggtatgaaa 1440

aagttcccgg aaagcatttc taccctggac gatctgatcg atatggtgac gatgtgtatt 1500

cacatcgcag ctccgcagca taccgccgtg aactatctgc agcaatatta ccaaacgttt 1560

gttccgaata aaccgtcagc actgttctcg ccgctgccga ccctgctgag ccagctggaa 1620

tcttacacgg aaagtgatct gatggcggcc ctgccgctgg gtgctaaaca ggaatggctg 1680

ctgatggcgc aagtgccgta tctgctgtct aaggaagtcg aacaggatgg caacattgtg 1740

acctacgccg gtacggcaag taacaatgaa gatccgatta tcgcagctgc gggcaaagaa 1800

ctgtccgctg acctggtcat cctggcgggt gtgtttctga aaaactcaga aaagctggac 1860

gatcagaaca ccgcctataa tgtcctggca ccggatcaac tggccaatgc aattgtgatc 1920

taa 1923

<210> 49
<211> 495
<212> PRT
<213> Cichorium intybus

<400> 49

Met Glu Ile Ser Ile Pro Thr Thr Leu Gly Leu Ala Val Ile Ile Phe
1 5 10 15

Ile Ile Phe Lys Leu Leu Thr Arg Thr Thr Ser Lys Lys Asn Leu Leu
20 25 30

Pro Glu Pro Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Ile
35 40 45

Gly Thr Met Pro His Arg Gly Val Met Glu Leu Ala Arg Lys His Gly
50 55 60

Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Thr Ile Val Val Ser
65 70 75 80

Ser Pro Arg Trp Ala Lys Glu Val Leu Thr Thr Tyr Asp Ile Thr Phe

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                85                  90                  95

Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Val Ala Tyr His Asn
            100                 105                 110

Thr Asp Ile Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125

Lys Leu Cys Thr Leu Glu Leu Leu Ser Asn Lys Lys Val Lys Ser Phe
    130                 135                 140

Gln Ser Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Lys Asp Ile Arg
145                 150                 155                 160

Ser Thr Gly Gln Gly Ser Pro Ile Asn Leu Ser Glu Asn Ile Phe Lys
                165                 170                 175

Met Ile Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190

Asp Gln Met Lys Phe Thr Glu Leu Val Lys Glu Ile Leu Arg Leu Thr
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Leu Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Ala Lys Leu Thr Asn Ile His Asn Lys Leu
225                 230                 235                 240

Asp Asn Leu Ile Asn Asn Ile Ile Ala Glu His Pro Gly Asn Arg Thr
                245                 250                 255

Ser Ser Ser Gln Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Glu
            260                 265                 270

Ser Ala Glu Phe Pro Leu Thr Ala Asp Asn Val Lys Ala Val Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Ile Glu Trp
    290                 295                 300
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```
Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320

Thr Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Arg Ile Gln Glu Glu
                325                 330                 335

Asp Leu Gln Glu Leu Asn Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Glu
        355                 360                 365

Pro Cys Val Leu Gly Gly Tyr Asp Ile Pro Ser Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Thr Phe Met Pro Glu Arg Phe Glu Asn Ser Pro Ile Thr Val Met
                405                 410                 415

Gly Ser Glu Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ala Ala Leu Gly Leu Ala Asn Val Glu Leu Pro Leu Ala His
        435                 440                 445

Ile Leu Tyr Phe Asn Trp Lys Leu Pro Asn Gly Lys Thr Phe Glu Asp
    450                 455                 460

Leu Asp Met Thr Glu Ser Phe Gly Ala Thr Val Gln Arg Lys Thr Glu
465                 470                 475                 480

Leu Leu Leu Val Pro Thr Asp Phe Gln Thr Leu Thr Ala Ser Thr
                485                 490                 495
```

<210> 50
<211> 493
<212> PRT
<213> Cichorium intybus

<400> 50

Met Ala Leu Leu Leu Ala Val Phe Leu Ala Val Ile Ile Phe Ile Ile
1   5   10   15

Phe Lys Leu Leu Thr Arg Thr Thr Ser Lys Lys Asn Leu Leu Pro Glu
            20   25   30

Pro Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Ile Gly Thr
        35   40   45

Met Pro His Arg Gly Val Met Glu Leu Ala Arg Lys His Gly Ser Leu
    50   55   60

Met His Leu Gln Leu Gly Glu Val Ser Thr Ile Val Val Ser Ser Pro
65   70   75   80

Arg Trp Ala Lys Glu Val Leu Thr Thr Tyr Asp Ile Thr Phe Ala Asn
                85   90   95

Arg Pro Glu Thr Leu Thr Gly Glu Ile Val Ala Tyr His Asn Thr Asp
            100   105   110

Ile Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg Lys Leu
        115   120   125

Cys Thr Leu Glu Leu Leu Ser Asn Lys Lys Val Lys Ser Phe Gln Ser
    130   135   140

Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Lys Asp Ile Arg Ser Thr
145   150   155   160

Gly Gln Gly Ser Pro Ile Asn Leu Ser Glu Asn Ile Phe Lys Met Ile
                165   170   175

Ala Thr Ile Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys Asp Gln
            180   185   190

Met Lys Phe Thr Glu Leu Val Lys Glu Ile Leu Arg Leu Thr Gly Gly
        195   200   205

```
Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Leu Leu His His Leu
    210                 215                 220

Ser Gly Lys Arg Ala Lys Leu Thr Asn Ile His Asn Lys Leu Asp Asn
225                 230                 235                 240

Leu Ile Asn Asn Ile Ile Ala Glu His Pro Gly Asn Arg Thr Ser Ser
                245                 250                 255

Ser Gln Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Glu Ser Ala
            260                 265                 270

Glu Phe Pro Leu Thr Ala Asp Asn Val Lys Ala Val Ile Leu Asp Met
        275                 280                 285

Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Ile Glu Trp Ala Ile
    290                 295                 300

Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln Thr Glu
305                 310                 315                 320

Leu Arg Gln Ala Leu Asn Gly Lys Glu Arg Ile Gln Glu Glu Asp Leu
                325                 330                 335

Gln Glu Leu Asn Tyr Leu Lys Leu Val Ile Lys Glu Thr Leu Arg Leu
            340                 345                 350

His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Glu Pro Cys
        355                 360                 365

Val Leu Gly Gly Tyr Asp Ile Pro Ser Lys Thr Lys Leu Ile Val Asn
    370                 375                 380

Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala Glu Thr
385                 390                 395                 400

Phe Met Pro Glu Arg Phe Glu Asn Ser Pro Ile Thr Val Met Gly Ser
                405                 410                 415

Glu Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys Pro Gly
            420                 425                 430
```

```
Ala Ala Leu Gly Leu Ala Asn Val Glu Leu Pro Leu Ala His Ile Leu
        435                 440                 445


Tyr Phe Asn Trp Lys Leu Pro Asn Gly Lys Thr Phe Glu Asp Leu Asp
    450                 455                 460


Met Thr Glu Ser Phe Gly Ala Thr Val Gln Arg Lys Thr Glu Leu Leu
465                 470                 475                 480


Leu Val Pro Thr Asp Phe Gln Thr Leu Thr Ala Ser Thr
                485                 490


<210>  51
<211>  1482
<212>  DNA
<213>  Cichorium intybus

<400>  51
atggctctgt tattagcagt ttttctggct gtcattatct ttatcatctt caaactgctg       60

acccgcacca cctcgaagaa aaacctgctg ccggaaccgt ggcgtctgcc gattatcggc      120

cacatgcatc acctgattgg caccatgccg caccgtggtg tgatggaact ggcgcgcaaa      180

catggctcac tgatgcacct gcagctgggt gaagtgagca ccatcgtggt tagctctccg      240

cgttgggcga aagaagttct gaccacgtat gatattacct ttgccaaccg cccggaaacc      300

ctgacgggcg aaatcgtggc ataccataat acggacattg ttctggctcc gtatggtgaa      360

tactggcgtc agctgcgcaa actgtgcacc ctggaactgc tgagtaacaa aaaagtcaaa      420

tcttttcaaa gtctgcgtga agaagaatgt tggaatctgg tgaaagatat ccgctccacc      480

ggccagggtt caccgatcaa cctgtcggaa aacatcttca aaatgatcgc gacgatcctg      540

tctcgtgcgg cctttggcaa aggtattaaa gaccaaatga aattcaccga actggttaaa      600

gaaatcctgc gcctgacggg cggttttgat gtcgcagaca ttttcccgag taaaaaactg      660

ctgcatcacc tgtccggcaa acgtgctaaa ctgaccaaca tccataacaa actggataac      720

ctgatcaaca acattatcgc cgaacacccg ggtaatcgta ccagttcctc acaggaaacg      780

ctgctggatg ttctgctgcg cctgaaagaa agcgcagaat ttccgctgac cgcggacaat      840

gttaaagccg tcattctgga tatgttcggt gcaggcaccg acacgtcgag cgcaaccatt      900
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gaatgggcta tctctgaact gattcgttgc ccgcgcgcga tggaaaaagt gcagacggaa 960

ctgcgtcaag ccctgaacgg caaagaacgc atccaggaag aagatctgca agaactgaac 1020

tacctgaaac tggttatcaa agaaaccctg cgcctgcatc cgccgctgcc gctggtcatg 1080

ccgcgtgaat gccgcgaacc gtgtgtgctg ggcggttatg atatcccgag caaaaccaaa 1140

ctgatcgtca acgtgtttgc aattaatcgt gacccggaat actggaaaga cgctgaaacc 1200

tttatgccgg aacgcttcga aaacagcccg attacggtta tgggttctga atatgaatac 1260

ctgccgtttg gtgcaggtcg tcgcatgtgt ccgggtgcag ctctgggtct ggcgaatgtc 1320

gaactgccgc tggcccacat cctgtattac ttcaactgga aactgccgaa tggcaaaacc 1380

tttgaagatc tggacatgac cgaatccttc ggtgcaacgg tgcaacgcaa aaccgaactg 1440

ctgctggtgc cgacggattt ccaaacgctg accgcatcaa cg 1482

<210> 52
<211> 488
<212> PRT
<213> Helianthus annuus

<400> 52

Met Glu Val Ser Leu Thr Thr Ser Ile Ala Leu Ala Thr Ile Val Phe
1 5 10 15

Phe Leu Tyr Lys Leu Leu Thr Arg Pro Thr Ser Ser Lys Asn Arg Leu
20 25 30

Pro Glu Pro Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Ile
35 40 45

Gly Thr Met Pro His Arg Gly Val Met Asp Leu Ala Arg Lys Tyr Gly
50 55 60

Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Ala Ile Val Val Ser
65 70 75 80

Ser Pro Lys Trp Ala Lys Glu Ile Leu Thr Thr Tyr Asp Ile Pro Phe
85 90 95

Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Ile Ala Tyr His Asn
100 105 110

```
Thr Asp Ile Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125

Lys Leu Cys Thr Leu Glu Leu Leu Ser Val Lys Lys Val Lys Ser Phe
    130                 135                 140

Gln Ser Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Gln Glu Ile Lys
145                 150                 155                 160

Ala Ser Gly Ser Gly Thr Pro Phe Asn Leu Ser Glu Gly Ile Phe Lys
                165                 170                 175

Val Ile Ala Thr Val Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190

Asp Gln Lys Gln Phe Thr Glu Ile Val Lys Glu Ile Leu Arg Glu Thr
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Phe Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Gly Arg Leu Thr Ser Ile His Asn Lys Leu
225                 230                 235                 240

Asp Ser Leu Ile Asn Asn Leu Val Ala Glu His Thr Val Ser Lys Ser
                245                 250                 255

Ser Lys Val Asn Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Asn
            260                 265                 270

Ser Glu Glu Phe Pro Leu Thr Ala Asp Asn Val Lys Ala Ile Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Val Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320
```

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Ala Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Arg Ile Lys Glu Glu
                325                 330                 335

Glu Ile Gln Asp Leu Pro Tyr Leu Asn Leu Val Ile Arg Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Gln
        355                 360                 365

Ala Met Asn Leu Ala Gly Tyr Asp Val Ala Asn Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Ser Phe Asn Pro Glu Arg Phe Glu Asn Ser Asn Thr Thr Ile Met
                405                 410                 415

Gly Ala Asp Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ser Ala Leu Gly Leu Ala Asn Val Gln Leu Pro Leu Ala Asn
        435                 440                 445

Ile Leu Tyr Tyr Phe Lys Trp Lys Leu Pro Asn Gly Ala Ser His Asp
    450                 455                 460

Gln Leu Asp Met Thr Glu Ser Phe Gly Ala Thr Val Gln Arg Lys Thr
465                 470                 475                 480

Glu Leu Met Leu Val Pro Ser Phe
                485
```

<210> 53
<211> 488
<212> PRT
<213> Helianthus annuus

<400> 53

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Met Ala Leu Leu Leu Ala Val Phe Ile Ala Leu Ala Thr Ile Val Phe
1               5                   10                  15
```

```
Phe Leu Tyr Lys Leu Leu Thr Arg Pro Thr Ser Ser Lys Asn Arg Leu
            20                  25                  30

Pro Glu Pro Trp Arg Leu Pro Ile Ile Gly His Met His His Leu Ile
        35                  40                  45

Gly Thr Met Pro His Arg Gly Val Met Asp Leu Ala Arg Lys Tyr Gly
    50                  55                  60

Ser Leu Met His Leu Gln Leu Gly Glu Val Ser Ala Ile Val Val Ser
65                  70                  75                  80

Ser Pro Lys Trp Ala Lys Glu Ile Leu Thr Thr Tyr Asp Ile Pro Phe
                85                  90                  95

Ala Asn Arg Pro Glu Thr Leu Thr Gly Glu Ile Ile Ala Tyr His Asn
            100                 105                 110

Thr Asp Ile Val Leu Ala Pro Tyr Gly Glu Tyr Trp Arg Gln Leu Arg
        115                 120                 125

Lys Leu Cys Thr Leu Glu Leu Leu Ser Val Lys Lys Val Lys Ser Phe
    130                 135                 140

Gln Ser Leu Arg Glu Glu Glu Cys Trp Asn Leu Val Gln Glu Ile Lys
145                 150                 155                 160

Ala Ser Gly Ser Gly Thr Pro Phe Asn Leu Ser Glu Gly Ile Phe Lys
                165                 170                 175

Val Ile Ala Thr Val Leu Ser Arg Ala Ala Phe Gly Lys Gly Ile Lys
            180                 185                 190

Asp Gln Lys Gln Phe Thr Glu Ile Val Lys Glu Ile Leu Arg Glu Thr
        195                 200                 205

Gly Gly Phe Asp Val Ala Asp Ile Phe Pro Ser Lys Lys Phe Leu His
    210                 215                 220

His Leu Ser Gly Lys Arg Gly Arg Leu Thr Ser Ile His Asn Lys Leu
```

```
225                 230                 235                 240

Asp Ser Leu Ile Asn Asn Leu Val Ala Glu His Thr Val Ser Lys Ser
                245                 250                 255

Ser Lys Val Asn Glu Thr Leu Leu Asp Val Leu Leu Arg Leu Lys Asn
            260                 265                 270

Ser Glu Glu Phe Pro Leu Thr Ala Asp Asn Val Lys Ala Ile Ile Leu
        275                 280                 285

Asp Met Phe Gly Ala Gly Thr Asp Thr Ser Ser Ala Thr Val Glu Trp
    290                 295                 300

Ala Ile Ser Glu Leu Ile Arg Cys Pro Arg Ala Met Glu Lys Val Gln
305                 310                 315                 320

Ala Glu Leu Arg Gln Ala Leu Asn Gly Lys Glu Arg Ile Lys Glu Glu
                325                 330                 335

Glu Ile Gln Asp Leu Pro Tyr Leu Asn Leu Val Ile Arg Glu Thr Leu
            340                 345                 350

Arg Leu His Pro Pro Leu Pro Leu Val Met Pro Arg Glu Cys Arg Gln
        355                 360                 365

Ala Met Asn Leu Ala Gly Tyr Asp Val Ala Asn Lys Thr Lys Leu Ile
    370                 375                 380

Val Asn Val Phe Ala Ile Asn Arg Asp Pro Glu Tyr Trp Lys Asp Ala
385                 390                 395                 400

Glu Ser Phe Asn Pro Glu Arg Phe Glu Asn Ser Asn Thr Thr Ile Met
                405                 410                 415

Gly Ala Asp Tyr Glu Tyr Leu Pro Phe Gly Ala Gly Arg Arg Met Cys
            420                 425                 430

Pro Gly Ser Ala Leu Gly Leu Ala Asn Val Gln Leu Pro Leu Ala Asn
        435                 440                 445
```

Ile Leu Tyr Tyr Phe Lys Trp Lys Leu Pro Asn Gly Ala Ser His Asp
450 455 460

Gln Leu Asp Met Thr Glu Ser Phe Gly Ala Thr Val Gln Arg Lys Thr
465 470 475 480

Glu Leu Met Leu Val Pro Ser Phe
485

<210> 54
<211> 1464
<212> DNA
<213> Helianthus annuus

<400> 54
atggctctgt tattagcagt tttcatcgcc ctggcaacca ttgtcttttt cctgtataaa 60

ctgctgaccc gtccgacctc atctaaaaac cgtctgccgg aaccgtggcg cctgccgatt 120

atcggccaca tgcatcacct gattggcacc atgccgcacc gtggtgtcat ggatctggca 180

cgcaaatatg gcagcctgat gcatctgcaa ctgggtgaag tttctgcgat tgtggttagc 240

tctccgaaat gggccaaaga aattctgacc acctatgata ttccgtttgc gaaccgcccg 300

gaaaccctga cgggcgaaat tatcgcatac cacaataccg acattgtgct ggctccgtat 360

ggtgaatact ggcgtcaact gcgtaaactg tgcacgctgg aactgctgag tgttaaaaaa 420

gtcaaaagtt tccagagcct gcgtgaagaa gaatgttgga acctggttca agaaattaaa 480

gcgagcggca gcggcacccc gtttaatctg agtgaaggta ttttcaaagt gattgcgacc 540

gtgctgagcc gtgcggcatt tggtaaaggt atcaaagatc agaaacaatt caccgaaatt 600

gtcaaagaaa tcctgcgcga aacgggcggt tttgatgtgg cggacatctt tccgagcaaa 660

aaattcctgc atcacctgtc tggcaaacgt ggtcgcctga cctcaattca taacaaactg 720

gattcgctga tcaacaatct ggtcgccgaa cataccgtga gcaaaagcag caaagtgaat 780

gaaacgctgc tggatgtcct gctgcgtctg aaaaactcgg aagaatttcc gctgaccgca 840

gacaatgtga aagctattat cctggatatg ttcggtgcag gcaccgatac cagcagcgca 900

acggtggaat gggccattag cgaactgatc cgttgcccgc gcgcaatgga aaaagttcag 960

gcagaactgc gtcaagctct gaacggcaaa gaacgcatta aagaagaaga aatccaggat 1020

ctgccgtatc tgaatctggt tattcgtgaa accctgcgtc tgcatccgcc gctgccgctg 1080

gtcatgccgc gtgaatgtcg ccaagcaatg aacctggctg gctatgacgt ggcaaataaa 1140

accaaactga tcgtcaatgt gtttgcgatt aaccgtgacc cggaatactg gaaagacgcg 1200

gaaagtttta acccggaacg ctttgaaaac agcaacacca cgattatggg tgcggattat 1260

gaatacctgc cgtttggcgc cggtcgtcgc atgtgtccgg gcagcgcgct gggtctggcc 1320

aacgttcaac tgccgctggc caatatcctg tattacttca aatggaaact gccgaatggc 1380

gcctcacacg atcaactgga catgaccgaa tcgtttggtg caaccgtgca acgcaaaacg 1440

gaactgatgc tggttccgtc tttc 1464

<210> 55
<211> 504
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase

<400> 55

Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1 5 10 15

Gly Ala Val Ala Ala Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg Arg
20 25 30

Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val Pro
35 40 45

Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met Thr
50 55 60

Phe Thr Arg Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys Thr
65 70 75 80

Gly Ala Thr Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys Glu
85 90 95

Ala Leu Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser Lys
100 105 110

```
Ala Leu Lys Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser Asp
        115                 120                 125

Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala Val
    130                 135                 140

Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile Met
145                 150                 155                 160

Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn Pro
                165                 170                 175

Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu Phe
            180                 185                 190

Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu Tyr
        195                 200                 205

Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Phe Gln Val
    210                 215                 220

Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg Asp
225                 230                 235                 240

Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn Thr
                245                 250                 255

Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu Ile
            260                 265                 270

Lys Glu His Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser Tyr
        275                 280                 285

Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln Leu
    290                 295                 300

Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr Met
305                 310                 315                 320

Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys Leu
                325                 330                 335
```

```
Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu Lys
            340                 345                 350

Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile Phe
        355                 360                 365

His Glu Thr Leu Arg Arg His Ser Pro Val Pro Ile Ile Pro Leu Arg
    370                 375                 380

His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala Gly
385                 390                 395                 400

Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn Val
                405                 410                 415

Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu Asn
            420                 425                 430

Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys Arg
        435                 440                 445

Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Thr Ala Ser Ile Gly Ile
    450                 455                 460

Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr Gln
465                 470                 475                 480

Glu Glu Val Asn Thr Ile Gly Leu Thr Thr Gln Met Leu Arg Pro Leu
                485                 490                 495

Arg Ala Ile Ile Lys Pro Arg Ile
            500
```

<210> 56
<211> 505
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase

<400> 56

```
Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1               5                  10                  15

Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
            20                  25                  30

Arg Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val
        35                  40                  45

Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
    50                  55                  60

Thr Phe Thr Arg Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65                  70                  75                  80

Thr Gly Ala Thr Ser Val Val Val Val Ser Ser Asn Glu Ile Ala Lys
                85                  90                  95

Glu Ala Met Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
            100                 105                 110

Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser
        115                 120                 125

Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
    130                 135                 140

Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145                 150                 155                 160

Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175

Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190

Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205
```

```
Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240

Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255

Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu His Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300

Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350

Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Leu Pro Leu
    370                 375                 380

Arg His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400

Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415

Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430
```

Asn Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
435 440 445

Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly
450 455 460

Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr
465 470 475 480

Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
485 490 495

Leu Arg Ala Ile Ile Lys Pro Arg Ile
500 505

<210> 57
<211> 505
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase

<400> 57

Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1 5 10 15

Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
20 25 30

Arg Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val
35 40 45

Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
50 55 60

Thr Phe Thr Lys Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65 70 75 80

Thr Gly Ala Thr Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys
85 90 95

```
Glu Ala Met Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
            100                 105                 110

Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Gln Met Val Ala Met Ser
        115                 120                 125

Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
    130                 135                 140

Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145                 150                 155                 160

Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175

Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190

Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205

Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240

Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255

Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu His Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300
```

```
Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350

Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Leu Pro Leu
    370                 375                 380

Arg His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400

Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415

Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430

Asn Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
        435                 440                 445

Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly
    450                 455                 460

Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr
465                 470                 475                 480

Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
                485                 490                 495

Leu Arg Ala Ile Ile Lys Pro Arg Ile
            500                 505
```

<210> 58
<211> 505

<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase

<400> 58

```
Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1               5                  10                  15


Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
            20                  25                  30


Arg Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val
        35                  40                  45


Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
    50                  55                  60


Thr Phe Thr Arg Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65                  70                  75                  80


Thr Gly Ala Thr Ser Val Val Val Val Ser Ser Asn Glu Ile Ala Lys
                85                  90                  95


Glu Ala Met Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
            100                 105                 110


Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Gln Met Val Ala Met Ser
        115                 120                 125


Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
    130                 135                 140


Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145                 150                 155                 160


Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175


Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190
```

```
Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205

Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240

Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255

Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu His Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300

Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350

Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Leu Pro Leu
    370                 375                 380

Arg His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400
```

```
Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415


Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430


Asn Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
        435                 440                 445


Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly
    450                 455                 460


Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr
465                 470                 475                 480


Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
                485                 490                 495


Leu Arg Ala Ile Ile Lys Pro Arg Ile
            500                 505
```

<210> 59
<211> 504
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase

<400> 59

```
Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1               5                   10                  15


Gly Ala Val Ala Ala Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg Arg
            20                  25                  30


Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val Pro
        35                  40                  45


Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met Thr
    50                  55                  60
```

```
Phe Thr Lys Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys Thr
65                  70                  75                  80

Gly Ala Thr Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys Glu
                85                  90                  95

Ala Met Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser Lys
            100                 105                 110

Ala Leu Lys Val Leu Thr Ala Asp Lys Gln Met Val Ala Met Ser Asp
        115                 120                 125

Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala Val
    130                 135                 140

Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile Met
145                 150                 155                 160

Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn Pro
                165                 170                 175

Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu Phe
            180                 185                 190

Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu Tyr
        195                 200                 205

Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln Val
    210                 215                 220

Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg Asp
225                 230                 235                 240

Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn Thr
                245                 250                 255

Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu Ile
            260                 265                 270

Lys Glu His Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser Tyr
        275                 280                 285
```

```
Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln Leu
    290                 295                 300

Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr Met
305                 310                 315                 320

Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys Leu
                325                 330                 335

Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu Lys
            340                 345                 350

Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile Phe
        355                 360                 365

His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Leu Pro Leu Arg
    370                 375                 380

His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala Gly
385                 390                 395                 400

Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn Val
                405                 410                 415

Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu Asn
            420                 425                 430

Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys Arg
        435                 440                 445

Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly Ile
    450                 455                 460

Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr Gln
465                 470                 475                 480

Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro Leu
                485                 490                 495
```

Arg Ala Ile Ile Lys Pro Arg Ile
500

<210> 60
<211> 505
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase

<400> 60

Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1 5 10 15

Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
20 25 30

Arg Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val
35 40 45

Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
50 55 60

Thr Phe Thr Lys Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65 70 75 80

Thr Gly Ala Thr Ser Val Val Val Val Ser Ser Asn Glu Ile Ala Lys
85 90 95

Glu Ala Met Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
100 105 110

Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser
115 120 125

Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
130 135 140

Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145 150 155 160

```
Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175

Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190

Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205

Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240

Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255

Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu His Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300

Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350

Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Ile Pro Leu
    370                 375                 380
```

```
Arg His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400


Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415


Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430


Asn Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
        435                 440                 445


Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly
    450                 455                 460


Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr
465                 470                 475                 480


Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
                485                 490                 495


Leu Arg Ala Ile Ile Lys Pro Arg Ile
            500                 505


<210>  61
<211>  505
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic - Engineered valencene oxidase

<400>  61

Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1               5                   10                  15


Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
            20                  25                  30


Arg Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val
        35                  40                  45
```

```
Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
    50                  55                  60

Thr Phe Thr Lys Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65                  70                  75                  80

Thr Gly Ala Thr Ser Val Val Val Val Ser Ser Asn Glu Ile Ala Lys
                85                  90                  95

Glu Ala Leu Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
            100                 105                 110

Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Gln Met Val Ala Met Ser
        115                 120                 125

Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
    130                 135                 140

Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145                 150                 155                 160

Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175

Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190

Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205

Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240

Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255
```

```
Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu Gln Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300

Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350

Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Leu Pro Leu
    370                 375                 380

Arg His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400

Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415

Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430

Asn Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
        435                 440                 445

Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly
    450                 455                 460

Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr
465                 470                 475                 480
```

```
Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
                485                 490                 495


Leu Arg Ala Ile Ile Lys Pro Arg Ile
            500                 505


<210>  62
<211>  710
<212>  PRT
<213>  Stevia rebaudiana

<400>  62

Met Gln Ser Asp Ser Val Lys Val Ser Pro Phe Asp Leu Val Ser Ala
1               5                   10                  15


Ala Met Asn Gly Lys Ala Met Glu Lys Leu Asn Ala Ser Glu Ser Glu
            20                  25                  30


Asp Pro Thr Thr Leu Pro Ala Leu Lys Met Leu Val Glu Asn Arg Glu
        35                  40                  45


Leu Leu Thr Leu Phe Thr Thr Ser Phe Ala Val Leu Ile Gly Cys Leu
    50                  55                  60


Val Phe Leu Met Trp Arg Arg Ser Ser Ser Lys Lys Leu Val Gln Asp
65                  70                  75                  80


Pro Val Pro Gln Val Ile Val Val Lys Lys Lys Glu Lys Glu Ser Glu
                85                  90                  95


Val Asp Asp Gly Lys Lys Lys Val Ser Ile Phe Tyr Gly Thr Gln Thr
            100                 105                 110


Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Val Glu Glu Ala Lys Val
        115                 120                 125


Arg Tyr Glu Lys Thr Ser Phe Lys Val Ile Asp Leu Asp Asp Tyr Ala
    130                 135                 140


Ala Asp Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Ser Leu Ala
```

```
145                 150                 155                 160

Phe Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala
                165                 170                 175

Ala Asn Phe Tyr Lys Trp Phe Thr Glu Gly Asp Asp Lys Gly Glu Trp
            180                 185                 190

Leu Lys Lys Leu Gln Tyr Gly Val Phe Gly Leu Gly Asn Arg Gln Tyr
        195                 200                 205

Glu His Phe Asn Lys Ile Ala Ile Val Val Asp Asp Lys Leu Thr Glu
    210                 215                 220

Met Gly Ala Lys Arg Leu Val Pro Val Gly Leu Gly Asp Asp Asp Gln
225                 230                 235                 240

Cys Ile Glu Asp Asp Phe Thr Ala Trp Lys Glu Leu Val Trp Pro Glu
                245                 250                 255

Leu Asp Gln Leu Leu Arg Asp Glu Asp Asp Thr Ser Val Thr Thr Pro
            260                 265                 270

Tyr Thr Ala Ala Val Leu Glu Tyr Arg Val Val Tyr His Asp Lys Pro
        275                 280                 285

Ala Asp Ser Tyr Ala Glu Asp Gln Thr His Thr Asn Gly His Val Val
    290                 295                 300

His Asp Ala Gln His Pro Ser Arg Ser Asn Val Ala Phe Lys Lys Glu
305                 310                 315                 320

Leu His Thr Ser Gln Ser Asp Arg Ser Cys Thr His Leu Glu Phe Asp
                325                 330                 335

Ile Ser His Thr Gly Leu Ser Tyr Glu Thr Gly Asp His Val Gly Val
            340                 345                 350

Tyr Ser Glu Asn Leu Ser Glu Val Val Asp Glu Ala Leu Lys Leu Leu
        355                 360                 365
```

```
Gly Leu Ser Pro Asp Thr Tyr Phe Ser Val His Ala Asp Lys Glu Asp
    370                 375                 380

Gly Thr Pro Ile Gly Gly Ala Ser Leu Pro Pro Pro Phe Pro Pro Cys
385                 390                 395                 400

Thr Leu Arg Asp Ala Leu Thr Arg Tyr Ala Asp Val Leu Ser Ser Pro
                405                 410                 415

Lys Lys Val Ala Leu Leu Ala Leu Ala Ala His Ala Ser Asp Pro Ser
            420                 425                 430

Glu Ala Asp Arg Leu Lys Phe Leu Ala Ser Pro Ala Gly Lys Asp Glu
        435                 440                 445

Tyr Ala Gln Trp Ile Val Ala Asn Gln Arg Ser Leu Leu Glu Val Met
    450                 455                 460

Gln Ser Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe Ala Ala
465                 470                 475                 480

Val Ala Pro Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro
                485                 490                 495

Lys Met Ser Pro Asn Arg Ile His Val Thr Cys Ala Leu Val Tyr Glu
            500                 505                 510

Thr Thr Pro Ala Gly Arg Ile His Arg Gly Leu Cys Ser Thr Trp Met
        515                 520                 525

Lys Asn Ala Val Pro Leu Thr Glu Ser Pro Asp Cys Ser Gln Ala Ser
    530                 535                 540

Ile Phe Val Arg Thr Ser Asn Phe Arg Leu Pro Val Asp Pro Lys Val
545                 550                 555                 560

Pro Val Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly
                565                 570                 575

Phe Leu Gln Glu Arg Leu Ala Leu Lys Glu Ser Gly Thr Glu Leu Gly
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580 585 590

Ser Ser Ile Phe Phe Phe Gly Cys Arg Asn Arg Lys Val Asp Phe Ile
595 600 605

Tyr Glu Asp Glu Leu Asn Asn Phe Val Glu Thr Gly Ala Leu Ser Glu
610 615 620

Leu Ile Val Ala Phe Ser Arg Glu Gly Thr Ala Lys Glu Tyr Val Gln
625 630 635 640

His Lys Met Ser Gln Lys Ala Ser Asp Ile Trp Lys Leu Leu Ser Glu
645 650 655

Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Lys Asp
660 665 670

Val His Arg Thr Leu His Thr Ile Val Gln Glu Gln Gly Ser Leu Asp
675 680 685

Ser Ser Lys Ala Glu Leu Tyr Val Lys Asn Leu Gln Met Ser Gly Arg
690 695 700

Tyr Leu Arg Asp Val Trp
705 710

<210> 63
<211> 2133
<212> DNA
<213> Stevia rebaudiana

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aaaatgctgg tagaaaaccg tgaactgctg actctgttca ccacctcctt cgccgttctg 180

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ccggttcctc aggtgatcgt cgttaaaaag aaagagaagg aaagcgaagt cgatgacggc 300

aaaaagaagg tttccatttt ctacggtact cagaccggca ccgctgaggg ttttgccaaa 360

gcactggttg aagaggcaaa agtgcgttac gaaaaaactt ccttcaaagt gattgacctg 420

gacgactatg ctgcggatga tgatgaatac gaggaaaaac tgaaaaaaga aagcctggcc 480

ttcttcttcc tggcaaccta tggcgatggt gaaccgaccg acaacgcggc gaacttctac 540

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aaactgactg aaatgggtgc gaaacgtctg gtgccggttg gcctgggtga cgatgatcaa 720

tgcatcgaag atgacttcac cgcatggaaa gaactggttt ggccggaact ggatcagctg 780

ctgcgcgacg aagacgacac ttccgtgacc accccgtata ccgctgcagt gctggagtac 840

cgtgttgttt accacgataa accggcggac tcttacgccg aagatcagac tcacactaac 900

ggtcacgtcg tacatgacgc acagcacccg tctcgtagca atgttgcgtt taagaaagag 960

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cgtggtctgt gctctacgtg gatgaaaaat gccgtgccgc tgaccgaatc cccggactgc 1620

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gcactgtccg aactgattgt ggcattctct cgtgaaggca cggcgaaaga atacgttcaa 1920

cacaaaatgt ctcagaaagc gagcgatatc tggaaactgc tgtccgaggg tgcgtatctg 1980

tatgtttgtg gcgacgcgaa aggcatggct aaagatgtac accgcaccct gcacaccatt 2040

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<211> 692
<212> PRT
<213> Arabidopsis thaliana

<400> 64

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Ile Met Gly Thr Asp Ser Leu Ser Asp Asp Val Val Leu Val Ile Ala
20 25 30

Thr Thr Ser Leu Ala Leu Val Ala Gly Phe Val Val Leu Leu Trp Lys
35 40 45

Lys Thr Thr Ala Asp Arg Ser Gly Glu Leu Lys Pro Leu Met Ile Pro
50 55 60

Lys Ser Leu Met Ala Lys Asp Glu Asp Asp Asp Leu Asp Leu Gly Ser
65 70 75 80

Gly Lys Thr Arg Val Ser Ile Phe Phe Gly Thr Gln Thr Gly Thr Ala
85 90 95

Glu Gly Phe Ala Lys Ala Leu Ser Glu Glu Ile Lys Ala Arg Tyr Glu
100 105 110

Lys Ala Ala Val Lys Val Ile Asp Leu Asp Asp Tyr Ala Ala Asp Asp
115 120 125

Asp Gln Tyr Glu Glu Lys Leu Lys Lys Glu Thr Leu Ala Phe Phe Cys
130 135 140

Val Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala Ala Arg Phe
145 150 155 160

Ser Lys Trp Phe Thr Glu Glu Asn Glu Arg Asp Ile Lys Leu Gln Gln

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                165                 170                 175

Leu Ala Tyr Gly Val Phe Ala Leu Gly Asn Arg Gln Tyr Glu His Phe
            180                 185                 190

Asn Lys Ile Gly Ile Val Leu Asp Glu Glu Leu Cys Lys Lys Gly Ala
        195                 200                 205

Lys Arg Leu Ile Glu Val Gly Leu Gly Asp Asp Asp Gln Ser Ile Glu
    210                 215                 220

Asp Asp Phe Asn Ala Trp Lys Glu Ser Leu Trp Ser Glu Leu Asp Lys
225                 230                 235                 240

Leu Leu Lys Asp Glu Asp Asp Lys Ser Val Ala Thr Pro Tyr Thr Ala
                245                 250                 255

Val Ile Pro Glu Tyr Arg Val Val Thr His Asp Pro Arg Phe Thr Thr
            260                 265                 270

Gln Lys Ser Met Glu Ser Asn Val Ala Asn Gly Asn Thr Thr Ile Asp
        275                 280                 285

Ile His His Pro Cys Arg Val Asp Val Ala Val Gln Lys Glu Leu His
    290                 295                 300

Thr His Glu Ser Asp Arg Ser Cys Ile His Leu Glu Phe Asp Ile Ser
305                 310                 315                 320

Arg Thr Gly Ile Thr Tyr Glu Thr Gly Asp His Val Gly Val Tyr Ala
                325                 330                 335

Glu Asn His Val Glu Ile Val Glu Glu Ala Gly Lys Leu Leu Gly His
            340                 345                 350

Ser Leu Asp Leu Val Phe Ser Ile His Ala Asp Lys Glu Asp Gly Ser
        355                 360                 365

Pro Leu Glu Ser Ala Val Pro Pro Pro Phe Pro Gly Pro Cys Thr Leu
    370                 375                 380
```

```
Gly Thr Gly Leu Ala Arg Tyr Ala Asp Leu Leu Asn Pro Pro Arg Lys
385                 390                 395                 400

Ser Ala Leu Val Ala Leu Ala Ala Tyr Ala Thr Glu Pro Ser Glu Ala
                405                 410                 415

Glu Lys Leu Lys His Leu Thr Ser Pro Asp Gly Lys Asp Glu Tyr Ser
            420                 425                 430

Gln Trp Ile Val Ala Ser Gln Arg Ser Leu Leu Glu Val Met Ala Ala
        435                 440                 445

Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe Ala Ala Ile Ala
    450                 455                 460

Pro Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Cys Gln Asp Trp
465                 470                 475                 480

Ala Pro Ser Arg Val His Val Thr Ser Ala Leu Val Tyr Gly Pro Thr
                485                 490                 495

Pro Thr Gly Arg Ile His Lys Gly Val Cys Ser Thr Trp Met Lys Asn
            500                 505                 510

Ala Val Pro Ala Glu Lys Ser His Glu Cys Ser Gly Ala Pro Ile Phe
        515                 520                 525

Ile Arg Ala Ser Asn Phe Lys Leu Pro Ser Asn Pro Ser Thr Pro Ile
    530                 535                 540

Val Met Val Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly Phe Leu
545                 550                 555                 560

Gln Glu Arg Met Ala Leu Lys Glu Asp Gly Glu Glu Leu Gly Ser Ser
                565                 570                 575

Leu Leu Phe Phe Gly Cys Arg Asn Arg Gln Met Asp Phe Ile Tyr Glu
            580                 585                 590

Asp Glu Leu Asn Asn Phe Val Asp Gln Gly Val Ile Ser Glu Leu Ile
```

595 600 605

Met Ala Phe Ser Arg Glu Gly Ala Gln Lys Glu Tyr Val Gln His Lys
610 615 620

Met Met Glu Lys Ala Ala Gln Val Trp Asp Leu Ile Lys Glu Glu Gly
625 630 635 640

Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Arg Asp Val His
645 650 655

Arg Thr Leu His Thr Ile Val Gln Glu Gln Glu Gly Val Ser Ser Ser
660 665 670

Glu Ala Glu Ala Ile Val Lys Lys Leu Gln Thr Glu Gly Arg Tyr Leu
675 680 685

Arg Asp Val Trp
690

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<211> 2079
<212> DNA
<213> Arabidopsis thaliana

<400> 65
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ggttttgtgg ttctgctgtg gaaaaagacc acggccgatc gttctggcga actgaaaccg 180

ctgatgattc cgaaaagtct gatggcaaag gacgaagatg acgatctgga tctgggctcc 240

ggtaaaaccc gtgtgtcaat ctttttcggt acccagacgg gcaccgcaga aggtttcgca 300

aaagctctgt ctgaagaaat taaggcgcgc tatgaaaaag cggccgttaa ggtcatcgat 360

ctggacgatt atgcagctga cgatgaccag tacgaagaaa aactgaaaaa ggaaaccctg 420

gcgtttttct gcgttgccac ctacggcgac ggtgaaccga cggataacgc ggcccgtttt 480

agtaaatggt tcaccgaaga aaatgaacgc gacattaagc tgcagcaact ggcgtatggc 540

gtgtttgctc tgggtaaccg tcagtacgaa catttcaaca agatcggtat cgtcctggat 600

gaagaactgt gtaaaaaggg cgcgaagcgc ctgattgaag tgggcctggg tgatgacgat 660

caatccatcg aagacgattt taacgcctgg aaagaatctc tgtggagtga actggacaaa 720

ctgctgaagg atgaagacga taagagcgtg gcgacgccgt ataccgccgt tattccggaa 780

taccgtgtcg tgacccatga tccgcgcttc accacgcaga aaagcatgga atcaaatgtt 840

gcgaacggta ataccacgat tgacatccat cacccgtgcc gtgtggatgt tgccgtccaa 900

aaagaactgc atacccacga atcggaccgt agctgtatcc acctggaatt tgatattagc 960

cgcacgggca tcacctatga aacgggcgac catgtgggtg tttacgcaga aaaccacgtg 1020

gaaattgttg aagaagctgg caaactgctg ggtcattcgc tggatctggt ttttagcatc 1080

cacgcggaca aggaagatgg ttcgccgctg gaaagcgcag tgccgccgcc gttcccgggt 1140

ccgtgcaccc tgggtacggg tctggcacgt tatgcagatc tgctgaatcc gccgcgcaaa 1200

tccgcactgg tggctctggc agcttacgca accgaaccgt cagaagctga aaaactgaag 1260

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gcagctattg caccgcgtct gcagccgcgc tattacagca tcagctcttg tcaagattgg 1440

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tcaaccccga tcgttatggt cggtccgggt acgggtctgg caccgtttcg tggtttcctg 1680

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ggctgccgta atcgccagat ggacttcatc tacgaagatg aactgaacaa cttcgtcgat 1800

caaggtgtga tttccgaact gatcatggca ttttcacgcg aaggcgctca gaaagaatac 1860

gtccaacata aaatgatgga aaaggcggcc caagtgtggg atctgatcaa agaagaaggc 1920

tatctgtacg tttgtggcga cgcaaagggt atggctcgtg atgtccatcg caccctgcac 1980

acgattgttc aggaacaaga aggtgtctca tcgagcgaag cggaagccat cgtgaaaaag 2040

ctgcagaccg aaggccgtta tctgcgcgat gtttggtaa 2079

<210> 66
<211> 717
<212> PRT
<213> Taxus cuspidata

<400> 66

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Met Gln Ala Asn Ser Asn Thr Val Glu Gly Ala Ser Gln Gly Lys Ser
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Leu Leu Asp Ile Ser Arg Leu Asp His Ile Phe Ala Leu Leu Leu Asn
            20                  25                  30

Gly Lys Gly Gly Asp Leu Gly Ala Met Thr Gly Ser Ala Leu Ile Leu
        35                  40                  45

Thr Glu Asn Ser Gln Asn Leu Met Ile Leu Thr Thr Ala Leu Ala Val
    50                  55                  60

Leu Val Ala Cys Val Phe Phe Phe Val Trp Arg Arg Gly Gly Ser Asp
65                  70                  75                  80

Thr Gln Lys Pro Ala Val Arg Pro Thr Pro Leu Val Lys Glu Glu Asp
                85                  90                  95

Glu Glu Glu Glu Asp Asp Ser Ala Lys Lys Lys Val Thr Ile Phe Phe
            100                 105                 110

Gly Thr Gln Thr Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Ala Glu
        115                 120                 125

Glu Ala Lys Ala Arg Tyr Glu Lys Ala Val Phe Lys Val Val Asp Leu
    130                 135                 140

Asp Asn Tyr Ala Ala Asp Asp Glu Gln Tyr Glu Glu Lys Leu Lys Lys
145                 150                 155                 160

Glu Lys Leu Ala Phe Phe Met Leu Ala Thr Tyr Gly Asp Gly Glu Pro
                165                 170                 175

Thr Asp Asn Ala Ala Arg Phe Tyr Lys Trp Phe Leu Glu Gly Lys Glu
            180                 185                 190

Arg Glu Pro Trp Leu Ser Asp Leu Thr Tyr Gly Val Phe Gly Leu Gly
        195                 200                 205
```

```
Asn Arg Gln Tyr Glu His Phe Asn Lys Val Ala Lys Ala Val Asp Glu
    210                 215                 220

Val Leu Ile Glu Gln Gly Ala Lys Arg Leu Val Pro Val Gly Leu Gly
225                 230                 235                 240

Asp Asp Asp Gln Cys Ile Glu Asp Asp Phe Thr Ala Trp Arg Glu Gln
                245                 250                 255

Val Trp Pro Glu Leu Asp Gln Leu Leu Arg Asp Glu Asp Asp Glu Pro
            260                 265                 270

Thr Ser Ala Thr Pro Tyr Thr Ala Ala Ile Pro Glu Tyr Arg Val Glu
        275                 280                 285

Ile Tyr Asp Ser Val Val Ser Val Tyr Glu Glu Thr His Ala Leu Lys
    290                 295                 300

Gln Asn Gly Gln Ala Val Tyr Asp Ile His His Pro Cys Arg Ser Asn
305                 310                 315                 320

Val Ala Val Arg Arg Glu Leu His Thr Pro Leu Ser Asp Arg Ser Cys
                325                 330                 335

Ile His Leu Glu Phe Asp Ile Ser Asp Thr Gly Leu Ile Tyr Glu Thr
            340                 345                 350

Gly Asp His Val Gly Val His Thr Glu Asn Ser Ile Glu Thr Val Glu
        355                 360                 365

Glu Ala Ala Lys Leu Leu Gly Tyr Gln Leu Asp Thr Ile Phe Ser Val
    370                 375                 380

His Gly Asp Lys Glu Asp Gly Thr Pro Leu Gly Gly Ser Ser Leu Pro
385                 390                 395                 400

Pro Pro Phe Pro Gly Pro Cys Thr Leu Arg Thr Ala Leu Ala Arg Tyr
                405                 410                 415

Ala Asp Leu Leu Asn Pro Pro Arg Lys Ala Ala Phe Leu Ala Leu Ala
```

```
            420                 425                 430

Ala His Ala Ser Asp Pro Ala Glu Ala Glu Arg Leu Lys Phe Leu Ser
        435                 440                 445

Ser Pro Ala Gly Lys Asp Glu Tyr Ser Gln Trp Val Thr Ala Ser Gln
    450                 455                 460

Arg Ser Leu Leu Glu Ile Met Ala Glu Phe Pro Ser Ala Lys Pro Pro
465                 470                 475                 480

Leu Gly Val Phe Phe Ala Ala Ile Ala Pro Arg Leu Gln Pro Arg Tyr
                485                 490                 495

Tyr Ser Ile Ser Ser Ser Pro Arg Phe Ala Pro Ser Arg Ile His Val
            500                 505                 510

Thr Cys Ala Leu Val Tyr Gly Pro Ser Pro Thr Gly Arg Ile His Lys
        515                 520                 525

Gly Val Cys Ser Asn Trp Met Lys Asn Ser Leu Pro Ser Glu Glu Thr
    530                 535                 540

His Asp Cys Ser Trp Ala Pro Val Phe Val Arg Gln Ser Asn Phe Lys
545                 550                 555                 560

Leu Pro Ala Asp Ser Thr Thr Pro Ile Val Met Val Gly Pro Gly Thr
                565                 570                 575

Gly Phe Ala Pro Phe Arg Gly Phe Leu Gln Glu Arg Ala Lys Leu Gln
            580                 585                 590

Glu Ala Gly Glu Lys Leu Gly Pro Ala Val Leu Phe Phe Gly Cys Arg
        595                 600                 605

Asn Arg Gln Met Asp Tyr Ile Tyr Glu Asp Glu Leu Lys Gly Tyr Val
    610                 615                 620

Glu Lys Gly Ile Leu Thr Asn Leu Ile Val Ala Phe Ser Arg Glu Gly
625                 630                 635                 640
```

```
Ala Thr Lys Glu Tyr Val Gln His Lys Met Leu Glu Lys Ala Ser Asp
                645                 650                 655

Thr Trp Ser Leu Ile Ala Gln Gly Gly Tyr Leu Tyr Val Cys Gly Asp
            660                 665                 670

Ala Lys Gly Met Ala Arg Asp Val His Arg Thr Leu His Thr Ile Val
        675                 680                 685

Gln Glu Gln Glu Ser Val Asp Ser Ser Lys Ala Glu Phe Leu Val Lys
    690                 695                 700

Lys Leu Gln Met Asp Gly Arg Tyr Leu Arg Asp Ile Trp
705                 710                 715
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<210> 67
<211> 2154
<212> DNA
<213> Taxus cuspidata

<400> 67

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atgaccggct cggctttgat tttgacagag aattcgcaga atttgatgat tttgaccacg      180

gctttggctg ttttggtcgc gtgtgttttc ttcttcgttt ggaggagggg aggatcggat      240

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gacgattctg caaagaagaa agtcacgatt ttctttggga cacagactgg gacggccgag      360

ggatttgcca aggctctagc agaagaggca aaggcaagat atgagaaagc tgtgtttaaa      420

gtcgtagatt tggacaacta tgcagcagat gatgagcagt atgaagaaaa attgaaaaag      480

gaaaaattag catttttat gctagcaacg tatggagatg gggagcccac tgacaatgca      540

gcaagatttt ataagtggtt tcttgagggc aaggagaggg agccatggct ttctgatctc      600

acttatgggg tgtttggatt aggcaacaga caatatgaac attttaataa ggtggctaaa      660

gcagtagatg aagtcttaat tgaacaaggt gcaaagcgac ttgttccagt gggccttggt      720

gatgatgacc aatgcattga agatgacttt actgcttggc gagagcaggt ttggcctgaa      780

ctggatcagt tactccggga tgaagatgat gagcccacaa gtgctacacc ttatacagct      840
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gccatacctg agtatagggt tgaaatttat gattccgtgg tttcagtgta cgaggaaact 900

catgctctca agcaaaatgg ccaagctgtt tatgatatcc atcacccctg cagatctaat 960

gtggcagtga gaagagagct tcatacacct ttgtctgacc gctcttgcat ccatttggaa 1020

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ccacctttcc ctggtccatg caccctacga actgctcttg ctcgttatgc tgatttgctg 1260

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tcctctccca ggtttgcacc ctcaagaata catgtgacat gtgctcttgt ttacgggccc 1560

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gctgttttat tttttgggtg caggaatcgc caaatggact acatttatga agatgagctg 1860

aagggctatg tggagaaagg aatactgacc aatctcattg ttgctttctc tcgtgaagga 1920

gcaaccaaag agtatgtcca gcacaagatg ctggaaaagg catccgatac ctggagtctc 1980

attgctcagg gtgggtatct ttatgtatgt ggtgatgcca agggtatggc tagggatgta 2040

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<210> 68
<211> 705
<212> PRT
<213> Artemisia annua

<400> 68

Met Ala Gln Ser Thr Thr Ser Val Lys Leu Ser Pro Phe Asp Leu Met

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Thr Ala Leu Leu Asn Gly Lys Val Ser Phe Asp Thr Ser Asn Thr Ser
            20                  25                  30

Asp Thr Asn Ile Pro Leu Ala Val Phe Met Glu Asn Arg Glu Leu Leu
        35                  40                  45

Met Ile Leu Thr Thr Ser Val Ala Val Leu Ile Gly Cys Val Val Val
    50                  55                  60

Leu Val Trp Arg Arg Ser Ser Ser Ala Ala Lys Lys Ala Ala Glu Ser
65                  70                  75                  80

Pro Val Ile Val Val Pro Lys Lys Val Thr Glu Asp Glu Val Asp Asp
                85                  90                  95

Gly Arg Lys Lys Val Thr Val Phe Phe Gly Thr Gln Thr Gly Thr Ala
            100                 105                 110

Glu Gly Phe Ala Lys Ala Leu Val Glu Glu Ala Lys Ala Arg Tyr Glu
        115                 120                 125

Lys Ala Val Phe Lys Val Ile Asp Leu Asp Asp Tyr Ala Ala Glu Asp
    130                 135                 140

Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Ser Leu Ala Phe Phe Phe
145                 150                 155                 160

Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala Ala Arg Phe
                165                 170                 175

Tyr Lys Trp Phe Thr Glu Gly Glu Glu Lys Gly Glu Trp Leu Asp Lys
            180                 185                 190

Leu Gln Tyr Ala Val Phe Gly Leu Gly Asn Arg Gln Tyr Glu His Phe
        195                 200                 205

Asn Lys Ile Ala Lys Val Val Asp Glu Lys Leu Val Glu Gln Gly Ala
    210                 215                 220
```

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Lys Arg Leu Val Pro Val Gly Met Gly Asp Asp Asp Gln Cys Ile Glu
225                 230                 235                 240

Asp Asp Phe Thr Ala Trp Lys Glu Leu Val Trp Pro Glu Leu Asp Gln
                245                 250                 255

Leu Leu Arg Asp Glu Asp Asp Thr Ser Val Ala Thr Pro Tyr Thr Ala
            260                 265                 270

Ala Val Ala Glu Tyr Arg Val Val Phe His Asp Lys Pro Glu Thr Tyr
        275                 280                 285

Asp Gln Asp Gln Leu Thr Asn Gly His Ala Val His Asp Ala Gln His
    290                 295                 300

Pro Cys Arg Ser Asn Val Ala Val Lys Lys Glu Leu His Ser Pro Leu
305                 310                 315                 320

Ser Asp Arg Ser Cys Thr His Leu Glu Phe Asp Ile Ser Asn Thr Gly
                325                 330                 335

Leu Ser Tyr Glu Thr Gly Asp His Val Gly Val Tyr Val Glu Asn Leu
            340                 345                 350

Ser Glu Val Val Asp Glu Ala Glu Lys Leu Ile Gly Leu Pro Pro His
        355                 360                 365

Thr Tyr Phe Ser Val His Ala Asp Asn Glu Asp Gly Thr Pro Leu Gly
    370                 375                 380

Gly Ala Ser Leu Pro Pro Pro Phe Pro Pro Cys Thr Leu Arg Lys Ala
385                 390                 395                 400

Leu Ala Ser Tyr Ala Asp Val Leu Ser Ser Pro Lys Lys Ser Ala Leu
                405                 410                 415

Leu Ala Leu Ala Ala His Ala Thr Asp Ser Thr Glu Ala Asp Arg Leu
            420                 425                 430

Lys Phe Leu Ala Ser Pro Ala Gly Lys Asp Glu Tyr Ala Gln Trp Ile
```

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        435                 440                 445

Val Ala Ser His Arg Ser Leu Leu Glu Val Met Glu Ala Phe Pro Ser
    450                 455                 460

Ala Lys Pro Pro Leu Gly Val Phe Phe Ala Ser Val Ala Pro Arg Leu
465                 470                 475                 480

Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro Arg Phe Ala Pro Asn
                485                 490                 495

Arg Ile His Val Thr Cys Ala Leu Val Tyr Glu Gln Thr Pro Ser Gly
            500                 505                 510

Arg Val His Lys Gly Val Cys Ser Thr Trp Met Lys Asn Ala Val Pro
        515                 520                 525

Met Thr Glu Ser Gln Asp Cys Ser Trp Ala Pro Ile Tyr Val Arg Thr
    530                 535                 540

Ser Asn Phe Arg Leu Pro Ser Asp Pro Lys Val Pro Val Ile Met Ile
545                 550                 555                 560

Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly Phe Leu Gln Glu Arg
                565                 570                 575

Leu Ala Gln Lys Glu Ala Gly Thr Glu Leu Gly Thr Ala Ile Leu Phe
            580                 585                 590

Phe Gly Cys Arg Asn Arg Lys Val Asp Phe Ile Tyr Glu Asp Glu Leu
        595                 600                 605

Asn Asn Phe Val Glu Thr Gly Ala Leu Ser Glu Leu Val Thr Ala Phe
    610                 615                 620

Ser Arg Glu Gly Ala Thr Lys Glu Tyr Val Gln His Lys Met Thr Gln
625                 630                 635                 640

Lys Ala Ser Asp Ile Trp Asn Leu Leu Ser Glu Gly Ala Tyr Leu Tyr
                645                 650                 655
```

Val Cys Gly Asp Ala Lys Gly Met Ala Lys Asp Val His Arg Thr Leu
660 665 670

His Thr Ile Val Gln Glu Gln Gly Ser Leu Asp Ser Ser Lys Ala Glu
675 680 685

Leu Tyr Val Lys Asn Leu Gln Met Ala Gly Arg Tyr Leu Arg Asp Val
690 695 700

Trp
705

<210> 69
<211> 2118
<212> DNA
<213> Artemisia annua

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tttatggaga atagagagtt actcatgatt ttaacgactt ccgtggccgt gctcattggg 180

tgcgtcgtcg tacttgtctg gcgccggtca agtagcgcag caaagaaggc ggcggagtcc 240

ccggttatcg tcgtcccaaa gaaggttaca gaggacgagg tggacgacgg acgcaaaaaa 300

gtgacggtat tctttggtac acagaccgga accgcggaag gatttgctaa agcgctggtg 360

gaagaagcta aagcccgtta cgaaaaagcg gtattcaaag tgatagacct ggatgactat 420

gcggcagagg acgacgagta cgaggaaaaa ttgaaaaaag aatctcttgc gttctttttt 480

ctcgccactt acggcgatgg agaacctact gataatgcgg ctcggtttta taagtggttc 540

actgagggtg aagaaaaagg tgaatggctg gacaaattgc agtacgcagt atttggactc 600

gggaatcgtc aatatgaaca ttttaacaaa attgctaagg tcgtcgatga aaaactggtt 660

gagcagggtg cgaaacgtct ggtcccggtt ggaatgggcg atgacgacca gtgcattgaa 720

gacgacttta cagcatggaa ggaactggtg tggccggaac tggaccaact tttgcgtgac 780

gaggatgaca catctgtagc tacgccgtac actgctgcgg tagccgagta tagggtcgtt 840

tttcacgata aaccggaaac ctacgaccaa gaccagctca caaatggtca tgcagtacat 900

gatgcgcaac atccttgcag gtcaaatgtg gcggtgaaga aagagctgca cagtcctctg 960

tcagatcgtt cttgcaccca cctggaattt gacatatcca atacgggcct ttcgtatgaa 1020

accggagatc acgttggtgt ctatgttgaa aatctgtcgg aagtggttga tgaggcggaa 1080

aaacttatcg gtctgccgcc tcatacgtac ttttcagtcc acgctgataa tgaagacgga 1140

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gcgttccctt ccgctaagcc acctctgggg gtctttttcg ctagtgtggc accccgtcta 1440

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tatgttagaa catcaaactt tcgactgcca agtgacccga aagttccggt aattatgata 1680

ggtccaggaa cagggctggc tccctttcgc gggttcctcc aggaacgtct ggcgcagaag 1740

gaggcgggaa ctgaactggg gacggcgatt ttatttttcg ggtgtagaaa tcgtaaagtc 1800

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aaagcctcag atatatggaa cctgctgtcg gagggagcct atctttatgt ttgcggtgat 1980

gcaaaaggaa tggccaaaga tgtccaccgg accctccaca ctattgtgca ggaacagggt 2040

tcattagact caagtaaagc cgaactttac gtaaaaaatc tacagatggc gggccgttac 2100

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<210> 70
<211> 693
<212> PRT
<213> Arabidopsis thaliana

<400> 70

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Ser Ile Met Gly Thr Asp Ser Leu Ser Asp Asp Val Val Leu Val Ile

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            20                  25                  30

Ala Thr Thr Ser Leu Ala Leu Val Ala Gly Phe Val Val Leu Leu Trp
        35                  40                  45

Lys Lys Thr Thr Ala Asp Arg Ser Gly Glu Leu Lys Pro Leu Met Ile
    50                  55                  60

Pro Lys Ser Leu Met Ala Lys Asp Glu Asp Asp Asp Leu Asp Leu Gly
65                  70                  75                  80

Ser Gly Lys Thr Arg Val Ser Ile Phe Phe Gly Thr Gln Thr Gly Thr
                85                  90                  95

Ala Glu Gly Phe Ala Lys Ala Leu Ser Glu Glu Ile Lys Ala Arg Tyr
            100                 105                 110

Glu Lys Ala Ala Val Lys Val Ile Asp Leu Asp Asp Tyr Ala Ala Asp
        115                 120                 125

Asp Asp Gln Tyr Glu Glu Lys Leu Lys Lys Glu Thr Leu Ala Phe Phe
    130                 135                 140

Cys Val Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala Ala Arg
145                 150                 155                 160

Phe Tyr Lys Trp Phe Thr Glu Glu Asn Glu Arg Asp Ile Lys Leu Gln
                165                 170                 175

Gln Leu Ala Tyr Gly Val Phe Ala Leu Gly Asn Arg Gln Tyr Glu His
            180                 185                 190

Phe Asn Lys Ile Gly Ile Val Leu Asp Glu Glu Leu Cys Lys Lys Gly
        195                 200                 205

Ala Lys Arg Leu Ile Glu Val Gly Leu Gly Asp Asp Asp Gln Ser Ile
    210                 215                 220

Glu Asp Asp Phe Asn Ala Trp Lys Glu Ser Leu Trp Ser Glu Leu Asp
225                 230                 235                 240
```

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Lys Leu Leu Lys Asp Glu Asp Asp Lys Ser Val Ala Thr Pro Tyr Thr
                245                 250                 255

Ala Val Ile Pro Glu Tyr Arg Val Val Thr His Asp Pro Arg Phe Thr
            260                 265                 270

Thr Gln Lys Ser Met Glu Ser Asn Val Ala Asn Gly Asn Thr Thr Ile
        275                 280                 285

Asp Ile His His Pro Cys Arg Val Asp Val Ala Val Gln Lys Glu Leu
    290                 295                 300

His Thr His Glu Ser Asp Arg Ser Cys Ile His Leu Glu Phe Asp Ile
305                 310                 315                 320

Ser Arg Thr Gly Ile Thr Tyr Glu Thr Gly Asp His Val Gly Val Tyr
                325                 330                 335

Ala Glu Asn His Val Glu Ile Val Glu Glu Ala Gly Lys Leu Leu Gly
            340                 345                 350

His Ser Leu Asp Leu Val Phe Ser Ile His Ala Asp Lys Glu Asp Gly
        355                 360                 365

Ser Pro Leu Glu Ser Ala Val Pro Pro Pro Phe Pro Gly Pro Cys Thr
    370                 375                 380

Leu Gly Thr Gly Leu Ala Arg Tyr Ala Asp Leu Leu Asn Pro Pro Arg
385                 390                 395                 400

Lys Ser Ala Leu Val Ala Leu Ala Ala Tyr Ala Thr Glu Pro Ser Glu
                405                 410                 415

Ala Glu Lys Leu Lys His Leu Thr Ser Pro Asp Gly Lys Asp Glu Tyr
            420                 425                 430

Ser Gln Trp Ile Val Ala Ser Gln Arg Ser Leu Leu Glu Val Met Ala
        435                 440                 445

Ala Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe Ala Ala Ile
```

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    450                 455                 460

Ala Pro Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro Arg
465                 470                 475                 480

Leu Ala Pro Ser Arg Val His Val Thr Ser Ala Leu Val Tyr Gly Pro
                485                 490                 495

Thr Pro Thr Gly Arg Ile His Lys Gly Val Cys Ser Thr Trp Met Lys
            500                 505                 510

Asn Ala Val Pro Ala Glu Lys Ser His Glu Cys Ser Gly Ala Pro Ile
        515                 520                 525

Phe Ile Arg Ala Ser Asn Phe Lys Leu Pro Ser Asn Pro Ser Thr Pro
    530                 535                 540

Ile Val Met Val Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly Phe
545                 550                 555                 560

Leu Gln Glu Arg Met Ala Leu Lys Glu Asp Gly Glu Glu Leu Gly Ser
                565                 570                 575

Ser Leu Leu Phe Phe Gly Cys Arg Asn Arg Gln Met Asp Phe Ile Tyr
            580                 585                 590

Glu Asp Glu Leu Asn Asn Phe Val Asp Gln Gly Val Ile Ser Glu Leu
        595                 600                 605

Ile Met Ala Phe Ser Arg Glu Gly Ala Gln Lys Glu Tyr Val Gln His
    610                 615                 620

Lys Met Met Glu Lys Ala Ala Gln Val Trp Asp Leu Ile Lys Glu Glu
625                 630                 635                 640

Gly Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Arg Asp Val
                645                 650                 655

His Arg Thr Leu His Thr Ile Val Gln Glu Gln Glu Gly Val Ser Ser
            660                 665                 670
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Ser Glu Ala Glu Ala Ile Val Lys Lys Leu Gln Thr Glu Gly Arg Tyr
675 680 685

Leu Arg Asp Val Trp
690

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<211> 2082
<212> DNA
<213> Arabidopsis thaliana

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gcgggctttg tggtgttact gtggaagaag actaccgcag ataggagtgg tgaattgaaa 180

ccgctgatga tcccaaaaag tctgatggcc aaagatgagg atgatgatct ggatcttgga 240

tcagggaaga cgcgagtcag tatttttttc gggacccaga cgggcaccgc ggagggcttc 300

gccaaagctc tgtccgagga aataaaggcc agatacgaga aagccgccgt aaaggttata 360

gacctagatg attacgccgc tgatgacgat cagtatgagg agaaacttaa aaaggagact 420

ctggcgtttt tttgcgtggc aacttacgga gacggcgagc ccaccgataa tgcagctagg 480

ttttacaagt ggtttaccga ggagaacgaa cgagatataa agttacagca gttggcctat 540

ggcgtgtttg ccctgggtaa tcggcaatat gagcatttca acaaaattgg catcgttctg 600

gatgaggaat tgtgcaaaaa gggtgcaaaa cggctgatag aggtgggtct aggtgacgat 660

gatcaatcta tagaagacga ttttaatgcg tggaaagaga gcttatggag tgaactggat 720

aagctcttga aagatgaaga cgacaagtca gtggcgaccc cttataccgc ggtaatcccg 780

gaataccgcg tcgtgacaca cgatccgagg tttacaaccc aaaaatctat ggagtctaat 840

gtcgccaatg gcaacacaac gattgatatt caccacccct gtcgtgttga cgtggctgtt 900

caaaaagaac ttcatacaca cgaaagtgac cgaagttgca tacacttgga atttgacatt 960

agtcgcaccg gaattacgta tgaaactggt gatcacgtgg gtgtatacgc agaaaatcat 1020

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atacatgccg ataaagagga tggcagccca ttggaaagtg ccgtccctcc gccgtttcct 1140

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aaacatctga catcaccgga tggcaaagac gagtatagtc agtggatagt agcctctcag 1320

cgctctctgc tggaagtgat ggccgcattt ccgtccgcca aaccaccttt gggagtattt 1380

ttcgctgcta tcgcacctcg gctccagccg cgctattaca gcatatcttc aagtccccgc 1440

ttagcaccgt ctcgtgtcca tgtcacttct gcgttggttt atggtccgac tccaacaggt 1500

cgcatccaca aaggtgtctg ttcaacctgg atgaaaaacg cggtgcccgc ggagaaatct 1560

catgagtgca gtggtgcacc tatttttatc cgcgcaagta acttcaaact cccttctaat 1620

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ggctatcttt atgtatgtgg ggatgcgaaa ggtatggccc gtgatgtcca tcgcaccctg 1980

cacacgattg tacaggaaca ggaaggtgtg tcctcgtccg aagcagaagc aatcgttaaa 2040

aaactgcaaa cagagggtcg ttaccttcgc gacgtgtggt aa 2082

<210> 72
<211> 712
<212> PRT
<213> Arabidopsis thaliana

<400> 72

Met Ala Ser Ser Ser Ser Ser Ser Ser Thr Ser Met Ile Asp Leu Met
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Ala Ala Ile Ile Lys Gly Glu Pro Val Ile Val Ser Asp Pro Ala Asn
20 25 30

Ala Ser Ala Tyr Glu Ser Val Ala Ala Glu Leu Ser Ser Met Leu Ile
35 40 45

Glu Asn Arg Gln Phe Ala Met Ile Val Thr Thr Ser Ile Ala Val Leu
50 55 60

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Ile Gly Cys Ile Val Met Leu Val Trp Arg Arg Ser Gly Ser Gly Asn
65                  70                  75                  80

Ser Lys Arg Val Glu Pro Leu Lys Pro Leu Val Ile Lys Pro Arg Glu
                85                  90                  95

Glu Glu Ile Asp Asp Gly Arg Lys Lys Val Thr Ile Phe Phe Gly Thr
            100                 105                 110

Gln Thr Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Gly Glu Glu Ala
        115                 120                 125

Lys Ala Arg Tyr Glu Lys Thr Arg Phe Lys Ile Val Asp Leu Asp Asp
    130                 135                 140

Tyr Ala Ala Asp Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Asp
145                 150                 155                 160

Val Ala Phe Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp
                165                 170                 175

Asn Ala Ala Arg Phe Tyr Lys Trp Phe Thr Glu Gly Asn Asp Arg Gly
            180                 185                 190

Glu Trp Leu Lys Asn Leu Lys Tyr Gly Val Phe Gly Leu Gly Asn Arg
        195                 200                 205

Gln Tyr Glu His Phe Asn Lys Val Ala Lys Val Val Asp Asp Ile Leu
    210                 215                 220

Val Glu Gln Gly Ala Gln Arg Leu Val Gln Val Gly Leu Gly Asp Asp
225                 230                 235                 240

Asp Gln Cys Ile Glu Asp Asp Phe Thr Ala Trp Arg Glu Ala Leu Trp
                245                 250                 255

Pro Glu Leu Asp Thr Ile Leu Arg Glu Glu Gly Asp Thr Ala Val Ala
            260                 265                 270

Thr Pro Tyr Thr Ala Ala Val Leu Glu Tyr Arg Val Ser Ile His Asp
```

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        275                 280                 285

Ser Glu Asp Ala Lys Phe Asn Asp Ile Asn Met Ala Asn Gly Asn Gly
    290                 295                 300

Tyr Thr Val Phe Asp Ala Gln His Pro Tyr Lys Ala Asn Val Ala Val
305                 310                 315                 320

Lys Arg Glu Leu His Thr Pro Glu Ser Asp Arg Ser Cys Ile His Leu
                325                 330                 335

Glu Phe Asp Ile Ala Gly Ser Gly Leu Thr Tyr Glu Thr Gly Asp His
            340                 345                 350

Val Gly Val Leu Cys Asp Asn Leu Ser Glu Thr Val Asp Glu Ala Leu
        355                 360                 365

Arg Leu Leu Asp Met Ser Pro Asp Thr Tyr Phe Ser Leu His Ala Glu
    370                 375                 380

Lys Glu Asp Gly Thr Pro Ile Ser Ser Ser Leu Pro Pro Pro Phe Pro
385                 390                 395                 400

Pro Cys Asn Leu Arg Thr Ala Leu Thr Arg Tyr Ala Cys Leu Leu Ser
                405                 410                 415

Ser Pro Lys Lys Ser Ala Leu Val Ala Leu Ala Ala His Ala Ser Asp
            420                 425                 430

Pro Thr Glu Ala Glu Arg Leu Lys His Leu Ala Ser Pro Ala Gly Lys
        435                 440                 445

Asp Glu Tyr Ser Lys Trp Val Val Glu Ser Gln Arg Ser Leu Leu Glu
    450                 455                 460

Val Met Ala Glu Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe
465                 470                 475                 480

Ala Gly Val Ala Pro Arg Leu Gln Pro Arg Phe Tyr Ser Ile Ser Ser
                485                 490                 495
```

```
Ser Pro Lys Ile Ala Glu Thr Arg Ile His Val Thr Cys Ala Leu Val
            500                 505                 510

Tyr Glu Lys Met Pro Thr Gly Arg Ile His Lys Gly Val Cys Ser Thr
        515                 520                 525

Trp Met Lys Asn Ala Val Pro Tyr Glu Lys Ser Glu Asn Cys Ser Ser
    530                 535                 540

Ala Pro Ile Phe Val Arg Gln Ser Asn Phe Lys Leu Pro Ser Asp Ser
545                 550                 555                 560

Lys Val Pro Ile Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe
                565                 570                 575

Arg Gly Phe Leu Gln Glu Arg Leu Ala Leu Val Glu Ser Gly Val Glu
            580                 585                 590

Leu Gly Pro Ser Val Leu Phe Phe Gly Cys Arg Asn Arg Arg Met Asp
        595                 600                 605

Phe Ile Tyr Glu Glu Glu Leu Gln Arg Phe Val Glu Ser Gly Ala Leu
    610                 615                 620

Ala Glu Leu Ser Val Ala Phe Ser Arg Glu Gly Pro Thr Lys Glu Tyr
625                 630                 635                 640

Val Gln His Lys Met Met Asp Lys Ala Ser Asp Ile Trp Asn Met Ile
                645                 650                 655

Ser Gln Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala
            660                 665                 670

Arg Asp Val His Arg Ser Leu His Thr Ile Ala Gln Glu Gln Gly Ser
        675                 680                 685

Met Asp Ser Thr Lys Ala Glu Gly Phe Val Lys Asn Leu Gln Thr Ser
    690                 695                 700

Gly Arg Tyr Leu Arg Asp Val Trp
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705 710

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<211> 2139
<212> DNA
<213> Arabidopsis thaliana

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gccgaattat catctatgtt aattgaaaat agacaatttg ccatgattgt gacaacttct 180

attgctgtgc tgataggttg catcgtcatg ctcgtgtggc gccgtagcgg atcaggcaac 240

tcaaagcgcg tcgagccttt gaaacccctg gttatcaaac cgcgagagga ggaaatcgat 300

gatggcagaa aaaaggttac tatctttttt ggcacacaga cggggacagc ggaaggtttc 360

gcgaaagcac tcggagagga agcgaaagcc cgatacgaga aaacacggtt caaaattgtg 420

gatctggatg actatgcggc tgatgatgat gagtatgaag aaaaactgaa aaaagaagat 480

gtggcgtttt tttttcttgc cacttatggc gacggagagc ccaccgataa tgcagcgcgg 540

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catctggctt ctccagcggg caaagatgaa tacagcaaat gggtggtaga atcacagcgt 1380

tccctactag aagtaatggc cgaatttccc tcagctaaac caccgctggg agtgttcttt 1440

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gcggaaacac ggatacatgt aacttgcgca ttggtttatg aaaaaatgcc aaccgggagg 1560

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aattgctcct ctgccccaat tttcgtgcgt caaagcaact ttaaactgcc gagtgattca 1680

aaggtgccta ttattatgat aggccctggt acaggactcg ccccgtttcg tggttttctt 1740

caagaaagac tggctctggt cgaatcaggc gtggaattag gaccctccgt gttatttttt 1800

ggctgccgca accgtcgaat ggacttcatc tatgaagaag aattgcaacg ttttgtggag 1860

tcaggcgctc tggcggaact atccgtcgcc tttagtagag aaggcccaac caaagaatac 1920

gtacagcata agatgatgga taaagcgagc gacatttgga atatgatctc acaaggggcg 1980

tacctgtacg tatgtggaga tgccaaagga atggcacgag acgtacatag atcgttgcat 2040

actattgctc aagaacaggg aagcatggat tcgactaaag cagaaggctt tgttaaaaat 2100

ctacagacat ctggtcgcta tctgcgtgac gtgtggtaa 2139

<210> 74
<211> 713
<212> PRT
<213> Arabidopsis thaliana

<400> 74

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Ala Ala Ile Ile Lys Gly Glu Pro Val Ile Val Ser Asp Pro Ala Asn
20 25 30

Ala Ser Ala Tyr Glu Ser Val Ala Ala Glu Leu Ser Ser Met Leu Ile
35 40 45

Glu Asn Arg Gln Phe Ala Met Ile Val Thr Thr Ser Ile Ala Val Leu
50 55 60

Ile Gly Cys Ile Val Met Leu Val Trp Arg Arg Ser Gly Ser Gly Asn
65 70 75 80

```
Ser Lys Arg Val Glu Pro Leu Lys Pro Leu Val Ile Lys Pro Arg Glu
                85                  90                  95

Glu Glu Ile Asp Asp Gly Arg Lys Lys Val Thr Ile Phe Phe Gly Thr
            100                 105                 110

Gln Thr Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Gly Glu Glu Ala
        115                 120                 125

Lys Ala Arg Tyr Glu Lys Thr Arg Phe Lys Ile Val Asp Leu Asp Asp
    130                 135                 140

Tyr Ala Ala Asp Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Asp
145                 150                 155                 160

Val Ala Phe Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp
                165                 170                 175

Asn Ala Ala Arg Phe Tyr Lys Trp Phe Thr Glu Gly Asn Asp Arg Gly
            180                 185                 190

Glu Trp Leu Lys Asn Leu Lys Tyr Gly Val Phe Gly Leu Gly Asn Arg
        195                 200                 205

Gln Tyr Glu His Phe Asn Lys Val Ala Lys Val Val Asp Asp Ile Leu
    210                 215                 220

Val Glu Gln Gly Ala Gln Arg Leu Val Gln Val Gly Leu Gly Asp Asp
225                 230                 235                 240

Asp Gln Cys Ile Glu Asp Asp Phe Thr Ala Trp Arg Glu Ala Leu Trp
                245                 250                 255

Pro Glu Leu Asp Thr Ile Leu Arg Glu Glu Gly Asp Thr Ala Val Ala
            260                 265                 270

Thr Pro Tyr Thr Ala Ala Val Leu Glu Tyr Arg Val Ser Ile His Asp
        275                 280                 285

Ser Glu Asp Ala Lys Phe Asn Asp Ile Thr Leu Ala Asn Gly Asn Gly
```

```
    290                 295                 300

Tyr Thr Val Phe Asp Ala Gln His Pro Tyr Lys Ala Asn Val Ala Val
305                 310                 315                 320

Lys Arg Glu Leu His Thr Pro Glu Ser Asp Arg Ser Cys Ile His Leu
                325                 330                 335

Glu Phe Asp Ile Ala Gly Ser Gly Leu Thr Met Lys Leu Gly Asp His
            340                 345                 350

Val Gly Val Leu Cys Asp Asn Leu Ser Glu Thr Val Asp Glu Ala Leu
        355                 360                 365

Arg Leu Leu Asp Met Ser Pro Asp Thr Tyr Phe Ser Leu His Ala Glu
    370                 375                 380

Lys Glu Asp Gly Thr Pro Ile Ser Ser Ser Leu Pro Pro Pro Phe Pro
385                 390                 395                 400

Pro Cys Asn Leu Arg Thr Ala Leu Thr Arg Tyr Ala Cys Leu Leu Ser
                405                 410                 415

Ser Pro Lys Lys Ser Ala Leu Val Ala Leu Ala Ala His Ala Ser Asp
            420                 425                 430

Pro Thr Glu Ala Glu Arg Leu Lys His Leu Ala Ser Pro Ala Gly Lys
        435                 440                 445

Asp Glu Tyr Ser Lys Trp Val Val Glu Ser Gln Arg Ser Leu Leu Glu
    450                 455                 460

Val Met Ala Glu Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe
465                 470                 475                 480

Ala Gly Val Ala Pro Arg Leu Gln Pro Arg Phe Tyr Ser Ile Ser Ser
                485                 490                 495

Ser Pro Lys Ile Ala Glu Thr Arg Ile His Val Thr Cys Ala Leu Val
            500                 505                 510
```

```
Tyr Glu Lys Met Pro Thr Gly Arg Ile His Lys Gly Val Cys Ser Thr
        515                 520                 525

Trp Met Lys Asn Ala Val Pro Tyr Glu Lys Ser Glu Lys Leu Phe Leu
    530                 535                 540

Gly Arg Pro Ile Phe Val Arg Gln Ser Asn Phe Lys Leu Pro Ser Asp
545                 550                 555                 560

Ser Lys Val Pro Ile Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro
                565                 570                 575

Phe Arg Gly Phe Leu Gln Glu Arg Leu Ala Leu Val Glu Ser Gly Val
            580                 585                 590

Glu Leu Gly Pro Ser Val Leu Phe Phe Gly Cys Arg Asn Arg Arg Met
        595                 600                 605

Asp Phe Ile Tyr Glu Glu Glu Leu Gln Arg Phe Val Glu Ser Gly Ala
    610                 615                 620

Leu Ala Glu Leu Ser Val Ala Phe Ser Arg Glu Gly Pro Thr Lys Glu
625                 630                 635                 640

Tyr Val Gln His Lys Met Met Asp Lys Ala Ser Asp Ile Trp Asn Met
                645                 650                 655

Ile Ser Gln Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met
            660                 665                 670

Ala Arg Asp Val His Arg Ser Leu His Thr Ile Ala Gln Glu Gln Gly
        675                 680                 685

Ser Met Asp Ser Thr Lys Ala Glu Gly Phe Val Lys Asn Leu Gln Thr
    690                 695                 700

Ser Gly Arg Tyr Leu Arg Asp Val Trp
705                 710
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<210> 75

<211> 2142
<212> DNA
<213> Arabidopsis thaliana

<400> 75
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aaaggagaac cagtcattgt gtctgatcct gcaaacgcat cagcctacga atctgtggct 120

gctgaactgt cctcgatgct gatcgaaaat cgccaatttg caatgattgt tacaaccagc 180

atcgctgttc ttatcgggtg tattgtcatg ctggtttggc ggcggagtgg cagcggcaat 240

tctaaaagag tggagccact gaagcctctg gtaatcaaac cccgcgaaga agaaatcgat 300

gatggacgta agaaagttac aatttttttt ggtacacaga caggtacagc agagggcttt 360

gccaaagctc ttggagaaga agcaaaagct cgatatgaga aaacacgctt caagatcgtc 420

gatctggatg actacgcggc agacgacgat gagtacgaag aaaaactcaa aaaagaggat 480

gtggcttttt ttttcctggc aacttatggg gacggcgagc ctaccgacaa tgcagcgcgg 540

ttttacaaat ggtttaccga aggcaatgat agaggggagt ggctcaaaaa tctcaaatac 600

ggagttttcg gattggggaa tagacaatac gaacacttta ataaggttgc gaaagtggta 660

gatgatattc tggtcgagca gggcgcgcaa cgtttagtac aggtcggcct gggtgatgac 720

gaccagtgca tcgaagatga ctttacggcc tggcgagaag cgctctggcc ggaattagat 780

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aacggcaacg gatataccgt atttgacgct caacatccgt ataaggccaa tgtagcagta 960

aagcgggaac tccatactcc cgaaagtgac agaagttgca tccatctgga gttcgatata 1020

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cacctggcga gtcctgctgg caaagatgaa tacagcaaat gggtggttga gtcgcagagg 1380

tccctgctgg aagtcatggc tgaatttccg tctgcgaaac cgcctctggg agttttcttc 1440

gcaggagtag ccccacgttt acaaccgcgt ttctattcta tttcttcctc ccccaagatc 1500

gcggaaactc gaatacacgt aacgtgcgca ttggtgtatg aaaagatgcc aactggtcgt 1560

atccacaagg gagtgtgctc aacctggatg aaaaacgccg ttccgtatga aaaatcggaa 1620

aaattgtttt tgggtagacc catattcgtt cggcagtcaa actttaaact accttctgat 1680

agcaaggttc cgattattat gattggaccg ggtactggcc tggcgccgtt ccgtggtttc 1740

ctgcaagaac ggttggcgct ggtggaatcc ggcgtggaac ttgggccatc ggttttgttt 1800

ttcgggtgcc gcaatcgtcg catggacttc atctacgagg aagaactcca gcgttttgtc 1860

gaaagcggtg cccttgctga attgtccgtt gcattcagcc gcgaaggtcc aactaaggag 1920

tatgtgcagc acaaaatgat ggacaaagcg agcgatattt ggaatatgat tagccagggc 1980

gcataccttt atgtgtgcgg tgatgctaag ggaatggcgc gcgatgtcca tagatcttta 2040

cataccattg cacaggagca gggctctatg gattcaacaa aagctgaagg ttttgtgaaa 2100

aaccttcaga ccagcgggcg gtatcttcgc gatgtttggt aa 2142

<210> 76
<211> 711
<212> PRT
<213> Stevia rebaudiana

<400> 76

Met Ala Gln Ser Asp Ser Val Lys Val Ser Pro Phe Asp Leu Val Ser
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Ala Ala Met Asn Gly Lys Ala Met Glu Lys Leu Asn Ala Ser Glu Ser
20 25 30

Glu Asp Pro Thr Thr Leu Pro Ala Leu Lys Met Leu Val Glu Asn Arg
35 40 45

Glu Leu Leu Thr Leu Phe Thr Thr Ser Phe Ala Val Leu Ile Gly Cys
50 55 60

Leu Val Phe Leu Met Trp Arg Arg Ser Ser Ser Lys Lys Leu Val Gln
65 70 75 80

Asp Pro Val Pro Gln Val Ile Val Val Lys Lys Lys Glu Lys Glu Ser
85 90 95

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Glu Val Asp Asp Gly Lys Lys Lys Val Ser Ile Phe Tyr Gly Thr Gln
            100                 105                 110

Thr Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Val Glu Glu Ala Lys
        115                 120                 125

Val Arg Tyr Glu Lys Thr Ser Phe Lys Val Ile Asp Leu Asp Asp Tyr
    130                 135                 140

Ala Ala Asp Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Ser Leu
145                 150                 155                 160

Ala Phe Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn
                165                 170                 175

Ala Ala Asn Phe Tyr Lys Trp Phe Thr Glu Gly Asp Asp Lys Gly Glu
            180                 185                 190

Leu Leu Lys Lys Leu Gln Tyr Gly Val Phe Gly Leu Gly Asn Arg Gln
        195                 200                 205

Tyr Glu His Phe Asn Lys Ile Ala Ile Val Val Asp Asp Lys Leu Thr
    210                 215                 220

Glu Met Gly Ala Lys Arg Leu Val Pro Val Gly Leu Gly Asp Asp Asp
225                 230                 235                 240

Gln Cys Ile Glu Asp Asp Phe Thr Ala Trp Lys Glu Leu Val Trp Pro
                245                 250                 255

Glu Leu Asp Gln Leu Leu Arg Asp Glu Asp Asp Thr Ser Val Thr Thr
            260                 265                 270

Pro Tyr Thr Ala Ala Val Leu Glu Tyr Arg Val Val Tyr His Asp Lys
        275                 280                 285

Pro Ala Asp Ser Tyr Ala Glu Asp Gln Thr His Thr Asn Gly His Val
    290                 295                 300

Val His Asp Ala Gln His Pro Ser Arg Ser Asn Val Ala Phe Lys Lys
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305                 310                 315                 320

Glu Leu His Thr Ser Gln Ser Asp Arg Ser Cys Thr His Leu Glu Phe
                325                 330                 335

Asp Ile Ser His Thr Gly Leu Ser Tyr Glu Thr Gly Asp His Val Gly
            340                 345                 350

Val Tyr Ser Glu Asn Leu Ser Glu Val Val Asp Glu Ala Leu Lys Leu
        355                 360                 365

Leu Gly Leu Ser Pro Asp Thr Tyr Phe Ser Val His Ala Asp Lys Glu
    370                 375                 380

Asp Gly Thr Pro Ile Gly Gly Ala Ser Leu Pro Pro Pro Phe Pro Pro
385                 390                 395                 400

Cys Thr Leu Arg Asp Ala Leu Thr Arg Tyr Ala Asp Val Leu Ser Ser
                405                 410                 415

Pro Lys Lys Val Ala Leu Leu Ala Leu Ala Ala His Ala Ser Asp Pro
            420                 425                 430

Ser Glu Ala Asp Arg Leu Lys Phe Leu Ala Ser Pro Ala Gly Lys Asp
        435                 440                 445

Glu Tyr Ala Gln Trp Ile Val Ala Asn Gln Arg Ser Leu Leu Glu Val
    450                 455                 460

Met Gln Ser Phe Pro Ser Ala Lys Pro Pro Leu Gly Val Phe Phe Ala
465                 470                 475                 480

Ala Val Ala Pro Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser
                485                 490                 495

Pro Lys Met Ser Pro Asn Arg Ile His Val Thr Cys Ala Leu Val Tyr
            500                 505                 510

Glu Thr Thr Pro Ala Gly Arg Ile His Arg Gly Leu Cys Ser Thr Trp
        515                 520                 525
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```
Met Lys Asn Ala Val Pro Leu Thr Glu Ser Pro Asp Cys Ser Gln Ala
    530                 535                 540

Ser Ile Phe Val Arg Thr Ser Asn Phe Arg Leu Pro Val Asp Pro Lys
545                 550                 555                 560

Val Pro Val Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg
                565                 570                 575

Gly Phe Leu Gln Glu Arg Leu Ala Leu Lys Glu Ser Gly Thr Glu Leu
            580                 585                 590

Gly Ser Ser Ile Phe Phe Phe Gly Cys Arg Asn Arg Lys Val Asp Phe
        595                 600                 605

Ile Tyr Glu Asp Glu Leu Asn Asn Phe Val Glu Thr Gly Ala Leu Ser
    610                 615                 620

Glu Leu Ile Val Ala Phe Ser Arg Glu Gly Thr Ala Lys Glu Tyr Val
625                 630                 635                 640

Gln His Lys Met Ser Gln Lys Ala Ser Asp Ile Trp Lys Leu Leu Ser
                645                 650                 655

Glu Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Lys
            660                 665                 670

Asp Val His Arg Thr Leu His Thr Ile Val Gln Glu Gln Gly Ser Leu
        675                 680                 685

Asp Ser Ser Lys Ala Glu Leu Tyr Val Lys Asn Leu Gln Met Ser Gly
    690                 695                 700

Arg Tyr Leu Arg Asp Val Trp
705                 710
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<210> 77
<211> 2136
<212> DNA
<213> Stevia rebaudiana

<400> 77
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ctgaaaatgc tggtagaaaa ccgtgaactg ctgactctgt tcaccacctc cttcgccgtt 180

ctgattggtt gcctggtctt cctgatgtgg cgccgttcct cttccaagaa gctggtacag 240

gacccggttc ctcaggtgat cgtcgttaaa aagaaagaga aggaaagcga agtcgatgac 300

ggcaaaaaga aggtttccat tttctacggt actcagaccg gcaccgctga gggttttgcc 360

aaagcactgg ttgaagaggc aaaagtgcgt tacgaaaaaa cttccttcaa agtgattgac 420

ctggacgact atgctgcgga tgatgatgaa tacgaggaaa aactgaaaaa agaaagcctg 480

gccttcttct tcctggcaac ctatggcgat ggtgaaccga ccgacaacgc ggcgaacttc 540

tacaaatggt ttaccgaagg cgacgacaaa ggtgaattgc tgaagaaact gcagtatggt 600

gttttcggtc tgggcaatcg ccagtacgaa cattttaaca aaatcgcaat cgttgttgat 660

gacaaactga ctgaaatggg tgcgaaacgt ctggtgccgg ttggcctggg tgacgatgat 720

caatgcatcg aagatgactt caccgcatgg aaagaactgg tttggccgga actggatcag 780

ctgctgcgcg acgaagacga cacttccgtg accaccccgt ataccgctgc agtgctggag 840

taccgtgttg tttaccacga taaaccggcg gactcttacg ccgaagatca gactcacact 900

aacggtcacg tcgtacatga cgcacagcac ccgtctcgta gcaatgttgc gtttaagaaa 960

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gtagttgatg aagcgctgaa actgctgggc ctgtctccag acacctactt tagcgtgcat 1140

gctgacaagg aagatggtac tccgattggc ggcgcttccc tgccgccacc gtttccacct 1200

tgcactctgc gtgatgctct gactcgttac gctgatgttc tgtctagccc gaaaaaggtt 1260

gcgctgctgg cgctggccgc acatgcttct gacccgtctg aagctgaccg tctgaaattc 1320

ctggcgtctc cggccggcaa agacgaatac gcgcagtgga ttgtcgctaa ccagcgctct 1380

ctgctggaag tgatgcagtc cttcccgtct gccaaaccgc cactgggcgt gtttttcgca 1440

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gttcctgtta tcatgatcgg tcctggcacg ggtctggccc cgtttcgtgg ttttctgcag 1740

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ctgtatgttt gtggcgacgc gaaaggcatg gctaaagatg tacaccgcac cctgcacacc 2040

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<210> 78
<211> 710
<212> PRT
<213> Stevia rebaudiana

<400> 78

Met Ala Gln Ser Glu Ser Val Glu Ala Ser Thr Ile Asp Leu Met Thr
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Ala Val Leu Lys Asp Thr Val Ile Asp Thr Ala Asn Ala Ser Asp Asn
20 25 30

Gly Asp Ser Lys Met Pro Pro Ala Leu Ala Met Met Phe Glu Ile Arg
35 40 45

Asp Leu Leu Leu Ile Leu Thr Thr Ser Val Ala Val Leu Val Gly Cys
50 55 60

Phe Val Val Leu Val Trp Lys Arg Ser Ser Gly Lys Lys Ser Gly Lys
65 70 75 80

Glu Leu Glu Pro Pro Lys Ile Val Val Pro Lys Arg Arg Leu Glu Gln
85 90 95

Glu Val Asp Asp Gly Lys Lys Lys Val Thr Ile Phe Phe Gly Thr Gln
100 105 110

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Thr Gly Thr Ala Glu Gly Phe Ala Lys Ala Leu Phe Glu Glu Ala Lys
        115                 120                 125

Ala Arg Tyr Glu Lys Ala Ala Phe Lys Val Ile Asp Leu Asp Asp Tyr
    130                 135                 140

Ala Ala Asp Leu Asp Glu Tyr Ala Glu Lys Leu Lys Lys Glu Thr Tyr
145                 150                 155                 160

Ala Phe Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn
                165                 170                 175

Ala Ala Lys Phe Tyr Lys Trp Phe Thr Glu Gly Asp Glu Lys Gly Val
            180                 185                 190

Trp Leu Gln Lys Leu Gln Tyr Gly Val Phe Gly Leu Gly Asn Arg Gln
        195                 200                 205

Tyr Glu His Phe Asn Lys Ile Gly Ile Val Val Asp Asp Gly Leu Thr
    210                 215                 220

Glu Gln Gly Ala Lys Arg Ile Val Pro Val Gly Leu Gly Asp Asp Asp
225                 230                 235                 240

Gln Ser Ile Glu Asp Asp Phe Ser Ala Trp Lys Glu Leu Val Trp Pro
                245                 250                 255

Glu Leu Asp Leu Leu Leu Arg Asp Glu Asp Asp Lys Ala Ala Ala Thr
            260                 265                 270

Pro Tyr Thr Ala Ala Ile Pro Glu Tyr Arg Val Val Phe His Asp Lys
        275                 280                 285

Pro Asp Ala Phe Ser Asp Asp His Thr Gln Thr Asn Gly His Ala Val
    290                 295                 300

His Asp Ala Gln His Pro Cys Arg Ser Asn Val Ala Val Lys Lys Glu
305                 310                 315                 320

Leu His Thr Pro Glu Ser Asp Arg Ser Cys Thr His Leu Glu Phe Asp
```

```
                325                 330                 335

Ile Ser His Thr Gly Leu Ser Tyr Glu Thr Gly Asp His Val Gly Val
            340                 345                 350

Tyr Cys Glu Asn Leu Ile Glu Val Val Glu Glu Ala Gly Lys Leu Leu
        355                 360                 365

Gly Leu Ser Thr Asp Thr Tyr Phe Ser Leu His Ile Asp Asn Glu Asp
    370                 375                 380

Gly Ser Pro Leu Gly Gly Pro Ser Leu Gln Pro Pro Phe Pro Pro Cys
385                 390                 395                 400

Thr Leu Arg Lys Ala Leu Thr Asn Tyr Ala Asp Leu Leu Ser Ser Pro
                405                 410                 415

Lys Lys Ser Thr Leu Leu Ala Leu Ala Ala His Ala Ser Asp Pro Thr
            420                 425                 430

Glu Ala Asp Arg Leu Arg Phe Leu Ala Ser Arg Glu Gly Lys Asp Glu
        435                 440                 445

Tyr Ala Glu Trp Val Val Ala Asn Gln Arg Ser Leu Leu Glu Val Met
    450                 455                 460

Glu Ala Phe Pro Ser Ala Arg Pro Pro Leu Gly Val Phe Phe Ala Ala
465                 470                 475                 480

Val Ala Pro Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro
                485                 490                 495

Lys Met Glu Pro Asn Arg Ile His Val Thr Cys Ala Leu Val Tyr Glu
            500                 505                 510

Lys Thr Pro Ala Gly Arg Ile His Lys Gly Ile Cys Ser Thr Trp Met
        515                 520                 525

Lys Asn Ala Val Pro Leu Thr Glu Ser Gln Asp Cys Ser Trp Ala Pro
    530                 535                 540
```

```
Ile Phe Val Arg Thr Ser Asn Phe Arg Leu Pro Ile Asp Pro Lys Val
545                 550                 555                 560


Pro Val Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly
                565                 570                 575


Phe Leu Gln Glu Arg Leu Ala Leu Lys Glu Ser Gly Thr Glu Leu Gly
            580                 585                 590


Ser Ser Ile Leu Phe Phe Gly Cys Arg Asn Arg Lys Val Asp Tyr Ile
        595                 600                 605


Tyr Glu Asn Glu Leu Asn Asn Phe Val Glu Asn Gly Ala Leu Ser Glu
    610                 615                 620


Leu Asp Val Ala Phe Ser Arg Asp Gly Pro Thr Lys Glu Tyr Val Gln
625                 630                 635                 640


His Lys Met Thr Gln Lys Ala Ser Glu Ile Trp Asn Met Leu Ser Glu
                645                 650                 655


Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Lys Asp
            660                 665                 670


Val His Arg Thr Leu His Thr Ile Val Gln Glu Gln Gly Ser Leu Asp
        675                 680                 685


Ser Ser Lys Ala Glu Leu Tyr Val Lys Asn Leu Gln Met Ser Gly Arg
    690                 695                 700


Tyr Leu Arg Asp Val Trp
705                 710


<210>  79
<211>  2133
<212>  DNA
<213>  Stevia rebaudiana

<400>  79
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gatacagtta ttgacactgc aaatgcttca gataacggcg attctaaaat gcctcctgcg      120
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cttgcgatga tgttcgagat ccgcgatctt ctgctgatcc ttaccacatc agtagcggtg 180

ctggtgggat gctttgtggt actcgtgtgg aaacgttcgt cgggcaaaaa atcaggtaag 240

gagctggaac cgcctaagat tgtcgtaccg aaacgccgac tggaacaaga agttgatgat 300

ggcaaaaaaa aagtgactat atttttgggg acacagacag gcacagcgga gggatttgcg 360

aaagccttat tcgaggaggc gaaggcacgt tacgagaaag cagcttttaa agtcattgat 420

ctggatgact atgcagcaga cctagatgaa tacgcagaga aactgaaaaa agaaacttat 480

gcgtttttct tcctggccac atacggagac ggtgaaccga cggacaatgc cgccaagttt 540

tataagtggt tcactgaagg ggatgagaaa ggtgtatggc ttcagaaatt gcaatacgga 600

gtgttcggac taggaaatcg gcaatatgag cactttaata aaataggcat agtagtagac 660

gatgggctaa ccgagcaggg ggccaaacgg attgtacccg tgggcctggg ggacgatgat 720

cagtctattg aggatgattt tagtgcttgg aaagagcttg tttggcctga actggactta 780

ctcctgcgtg atgaagacga taaagcggca gcgactccat acacggcagc aatccccgag 840

tatagagtcg tattccatga taaaccggat gctttctctg atgaccatac ccaaactaat 900

ggtcatgcgg tccatgatgc acaacatccc tgccgcagca atgtagcggt gaaaaaggag 960

ctgcatacgc ctgaaagtga tcgctcatgt acgcatctgg agtttgatat ttcacacaca 1020

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gttgaagagg ccgggaaact gttgggacta agtacagata cttatttttc tttacatata 1140

gataacgagg atggttcccc acttggcggt ccatctcttc agcctccatt cccaccatgt 1200

accttacgca aagcgctgac taactacgca gatctgctgt ctagcccaaa gaaatcaacg 1260

cttctggcgt tggctgctca tgcctcagat ccgaccgaag ctgatcgcct tcgttttctg 1320

gcatcccgag aaggtaaaga tgaatatgca gaatgggtgg tagcgaatca gcgttctttg 1380

ctggaagtca tggaggcatt ccccagcgcg cgccctccgc tgggtgtttt cttcgcagcg 1440

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ccagttatta tgattggtcc tggcaccgga cttgcgccat tccgggggtt tctgcaagaa 1740

agactggctc tgaaagaaag cggtacagaa ctcggctcca gtatattgtt tttcggctgt 1800

cgcaaccgga aagtagatta tatatatgaa aacgagctga ataacttcgt tgaaaatggt 1860

gccctgtctg aactcgatgt cgctttttcg cgagatggcc cgacaaaaga atacgtgcag 1920

cataaaatga cccagaaagc aagtgaaatc tggaatatgc tgtcagaagg ggcatatctg 1980

tatgtgtgcg gagatgcaaa gggcatggcc aaagacgttc acagaacctt gcataccata 2040

gtacaagagc agggctctct ggatagctca aaagccgagc tgtacgtgaa aaatctccag 2100

atgagtggac gctacctgag ggatgtttgg taa 2133

<210> 80
<211> 708
<212> PRT
<213> Stevia rebaudiana

<400> 80

Met Ala Gln Ser Asn Ser Val Lys Ile Ser Pro Leu Asp Leu Val Thr
1 5 10 15

Ala Leu Phe Ser Gly Lys Val Leu Asp Thr Ser Asn Ala Ser Glu Ser
20 25 30

Gly Glu Ser Ala Met Leu Pro Thr Ile Ala Met Ile Met Glu Asn Arg
35 40 45

Glu Leu Leu Met Ile Leu Thr Thr Ser Val Ala Val Leu Ile Gly Cys
50 55 60

Val Val Val Leu Val Trp Arg Arg Ser Ser Thr Lys Lys Ser Ala Leu
65 70 75 80

Glu Pro Pro Val Ile Val Val Pro Lys Arg Val Gln Glu Glu Glu Val
85 90 95

Asp Asp Gly Lys Lys Lys Val Thr Val Phe Phe Gly Thr Gln Thr Gly
100 105 110

Thr Ala Glu Gly Phe Ala Lys Ala Leu Val Glu Glu Ala Lys Ala Arg
115 120 125

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Tyr Glu Lys Ala Val Phe Lys Val Ile Asp Leu Asp Asp Tyr Ala Ala
    130                 135                 140

Asp Asp Asp Glu Tyr Glu Glu Lys Leu Lys Lys Glu Ser Leu Ala Phe
145                 150                 155                 160

Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala Ala
                165                 170                 175

Arg Phe Tyr Lys Trp Phe Thr Glu Gly Asp Ala Lys Gly Glu Trp Leu
            180                 185                 190

Asn Lys Leu Gln Tyr Gly Val Phe Gly Leu Gly Asn Arg Gln Tyr Glu
        195                 200                 205

His Phe Asn Lys Ile Ala Lys Val Val Asp Asp Gly Leu Val Glu Gln
    210                 215                 220

Gly Ala Lys Arg Leu Val Pro Val Gly Leu Gly Asp Asp Asp Gln Cys
225                 230                 235                 240

Ile Glu Asp Asp Phe Thr Ala Trp Lys Glu Leu Val Trp Pro Glu Leu
                245                 250                 255

Asp Gln Leu Leu Arg Asp Glu Asp Asp Thr Thr Val Ala Thr Pro Tyr
            260                 265                 270

Thr Ala Ala Val Ala Glu Tyr Arg Val Val Phe His Glu Lys Pro Asp
        275                 280                 285

Ala Leu Ser Glu Asp Tyr Ser Tyr Thr Asn Gly His Ala Val His Asp
    290                 295                 300

Ala Gln His Pro Cys Arg Ser Asn Val Ala Val Lys Lys Glu Leu His
305                 310                 315                 320

Ser Pro Glu Ser Asp Arg Ser Cys Thr His Leu Glu Phe Asp Ile Ser
                325                 330                 335

Asn Thr Gly Leu Ser Tyr Glu Thr Gly Asp His Val Gly Val Tyr Cys
```

```
            340                 345                 350

Glu Asn Leu Ser Glu Val Val Asn Asp Ala Glu Arg Leu Val Gly Leu
        355                 360                 365

Pro Pro Asp Thr Tyr Phe Ser Ile His Thr Asp Ser Glu Asp Gly Ser
    370                 375                 380

Pro Leu Gly Gly Ala Ser Leu Pro Pro Pro Phe Pro Pro Cys Thr Leu
385                 390                 395                 400

Arg Lys Ala Leu Thr Cys Tyr Ala Asp Val Leu Ser Ser Pro Lys Lys
                405                 410                 415

Ser Ala Leu Leu Ala Leu Ala Ala His Ala Thr Asp Pro Ser Glu Ala
            420                 425                 430

Asp Arg Leu Lys Phe Leu Ala Ser Pro Ala Gly Lys Asp Glu Tyr Ser
        435                 440                 445

Gln Trp Ile Val Ala Ser Gln Arg Ser Leu Leu Glu Val Met Glu Ala
    450                 455                 460

Phe Pro Ser Ala Lys Pro Ser Leu Gly Val Phe Phe Ala Ser Val Ala
465                 470                 475                 480

Pro Arg Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro Lys Met
                485                 490                 495

Ala Pro Asp Arg Ile His Val Thr Cys Ala Leu Val Tyr Glu Lys Thr
            500                 505                 510

Pro Ala Gly Arg Ile His Lys Gly Val Cys Ser Thr Trp Met Lys Asn
        515                 520                 525

Ala Val Pro Met Thr Glu Ser Gln Asp Cys Ser Trp Ala Pro Ile Tyr
    530                 535                 540

Val Arg Thr Ser Asn Phe Arg Leu Pro Ser Asp Pro Lys Val Pro Val
545                 550                 555                 560
```

Ile Met Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly Phe Leu
565 570 575

Gln Glu Arg Leu Ala Leu Lys Glu Ala Gly Thr Asp Leu Gly Leu Ser
580 585 590

Ile Leu Phe Phe Gly Cys Arg Asn Arg Lys Val Asp Phe Ile Tyr Glu
595 600 605

Asn Glu Leu Asn Asn Phe Val Glu Thr Gly Ala Leu Ser Glu Leu Ile
610 615 620

Val Ala Phe Ser Arg Glu Gly Pro Thr Lys Glu Tyr Val Gln His Lys
625 630 635 640

Met Ser Glu Lys Ala Ser Asp Ile Trp Asn Leu Leu Ser Glu Gly Ala
645 650 655

Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Lys Asp Val His
660 665 670

Arg Thr Leu His Thr Ile Val Gln Glu Gln Gly Ser Leu Asp Ser Ser
675 680 685

Lys Ala Glu Leu Tyr Val Lys Asn Leu Gln Met Ser Gly Arg Tyr Leu
690 695 700

Arg Asp Val Trp
705

<210> 81
<211> 2127
<212> DNA
<213> Stevia rebaudiana

<400> 81
atggcgcaat ctaattctgt gaaaatctct ccattggatc tggttacagc actctttagc 60

gggaaggtac tggatacaag taacgccagt gaaagcgggg aatccgcgat gctgccaaca 120

atcgcgatga tcatggaaaa tcgggaactg ctaatgattc tgacaacgtc tgtagcagtt 180

ttaatcggtt gcgttgtggt tctggtgtgg cgtcgatcat ccacgaaaaa gagcgcatta 240

gaaccgcctg ttatcgtagt accaaaaaga gttcaggagg aagaggtgga tgatgggaaa 300

aaaaaagtca ccgttttctt cgggacccaa actggtacgg cagaaggttt tgcgaaagca 360

ctggtcgaag aggcgaaagc ccgctatgag aaggcggttt ttaaggttat tgaccttgat 420

gactatgcgg cggacgatga tgaatacgaa gaaaaattaa agaaagaatc acttgccttt 480

tttttttgg caacatacgg tgatggcgag ccgactgata acgcggcacg gttttacaaa 540

tggtttaccg aaggcgacgc gaaggggggag tggttgaaca agttacagta cggtgtgttc 600

ggcttgggga accgccagta cgagcacttt aacaagatag ctaaagttgt cgatgatggt 660

ctggtagaac agggagcgaa gcgtctcgtg ccagtagggc tgggcgatga tgatcagtgt 720

atagaagatg attttacggc ttggaaggag ttagtttggc cggaactgga ccaactgctg 780

cgcgatgagg atgatacaac tgtcgctacc ccgtatacag cagcggtagc tgaatacagg 840

gtggtttttc acgagaaacc tgatgcgctg agtgaggact attcgtatac taacggccat 900

gccgttcacg atgcacagca cccgtgccgt tctaatgtcg ccgtaaaaaa ggaactgcat 960

agcccggagt cggaccgcag ttgtacccat ctggagtttg atatttcaaa taccgggctg 1020

agttacgaaa cgggcgatca cgttggcgtg tactgtgaga atctaagcga ggttgttaac 1080

gatgcagaac gactggtcgg tttgcctcca gatacttatt tctcgatcca cactgatagc 1140

gaagatggct ctccactcgg gggggcgagt ctgccgcccc cgtttccccc gtgtacgctg 1200

agaaaggccc ttacatgtta tgcagatgta ctctcttccc ccaaaaaaag tgccttgctc 1260

gcattagcag cccacgctac cgatccctcg gaagcagatc gtctgaaatt cttggcatcg 1320

ccggcgggca aagatgaata cagccaatgg atagttgcaa gtcagcgcag tctcttagaa 1380

gtgatggaag cgtttccgtc cgcaaagccg tccttaggtg tgtttttcgc gtccgtggca 1440

ccgcgtcttc agcctagata ttacagcatt agttcctctc caaaaatggc cccggaccgt 1500

attcacgtga cttgtgctct tgtatatgag aaaaccccgg caggtcgtat tcacaaaggc 1560

gtgtgcagca cctggatgaa gaatgcagtg ccgatgaccg aaagccagga ttgttcatgg 1620

gcgccaatct atgtcaggac aagtaatttc agacttccgt ctgatcctaa agttccagtc 1680

ataatgattg gccccggcac gggactggct ccttttcgtg gtttcctgca agagcgcttg 1740

gcactgaaag aagcaggcac tgacctggga ctgtccatcc tgttctttgg gtgccgtaat 1800

cgtaaggtcg attttatata tgaaaatgaa ttgaacaact ttgtagaaac aggcgcatta 1860

tccgaactga tcgtagcttt tagtagagag gggccgacga aagaatatgt acaacacaag 1920

atgtctgaga aggcttcgga tatatggaac ctgctctctg agggtgccta tctgtacgtt 1980

tgcggtgatg ccaaaggaat ggccaaagat gtgcaccgca ctttacatac aatcgtccaa 2040

gagcagggta gcttggactc atctaaagct gaactgtatg tgaagaactt acagatgagc 2100

gggcgctatt tgcgagatgt ttggtaa 2127

<210> 82
<211> 706
<212> PRT
<213> Pelargonium graveolens

<400> 82

Met Ala Gln Ser Ser Ser Gly Ser Met Ser Pro Phe Asp Phe Met Thr
1 5 10 15

Ala Ile Ile Lys Gly Lys Met Glu Pro Ser Asn Ala Ser Leu Gly Ala
20 25 30

Ala Gly Glu Val Thr Ala Met Ile Leu Asp Asn Arg Glu Leu Val Met
35 40 45

Ile Leu Thr Thr Ser Ile Ala Val Leu Ile Gly Cys Val Val Val Phe
50 55 60

Ile Trp Arg Arg Ser Ser Ser Gln Thr Pro Thr Ala Val Gln Pro Leu
65 70 75 80

Lys Pro Leu Leu Ala Lys Glu Thr Glu Ser Glu Val Asp Asp Gly Lys
85 90 95

Gln Lys Val Thr Ile Phe Phe Gly Thr Gln Thr Gly Thr Ala Glu Gly
100 105 110

Phe Ala Lys Ala Leu Ala Asp Glu Ala Lys Ala Arg Tyr Asp Lys Val
115 120 125

Thr Phe Lys Val Val Asp Leu Asp Asp Tyr Ala Ala Asp Asp Glu Glu
130 135 140

```
Tyr Glu Glu Lys Leu Lys Lys Glu Thr Leu Ala Phe Phe Phe Leu Ala
145                 150                 155                 160

Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn Ala Ala Arg Phe Tyr Lys
                165                 170                 175

Trp Phe Leu Glu Gly Lys Glu Arg Gly Glu Trp Leu Gln Asn Leu Lys
            180                 185                 190

Phe Gly Val Phe Gly Leu Gly Asn Arg Gln Tyr Glu His Phe Asn Lys
        195                 200                 205

Ile Ala Ile Val Val Asp Glu Ile Leu Ala Glu Gln Gly Gly Lys Arg
    210                 215                 220

Leu Ile Ser Val Gly Leu Gly Asp Asp Asp Gln Cys Ile Glu Asp Asp
225                 230                 235                 240

Phe Thr Ala Trp Arg Glu Ser Leu Trp Pro Glu Leu Asp Gln Leu Leu
                245                 250                 255

Arg Asp Glu Asp Asp Thr Thr Val Ser Thr Pro Tyr Thr Ala Ala Val
            260                 265                 270

Leu Glu Tyr Arg Val Val Phe His Asp Pro Ala Asp Ala Pro Thr Leu
        275                 280                 285

Glu Lys Ser Tyr Ser Asn Ala Asn Gly His Ser Val Val Asp Ala Gln
    290                 295                 300

His Pro Leu Arg Ala Asn Val Ala Val Arg Arg Glu Leu His Thr Pro
305                 310                 315                 320

Ala Ser Asp Arg Ser Cys Thr His Leu Glu Phe Asp Ile Ser Gly Thr
                325                 330                 335

Gly Ile Ala Tyr Glu Thr Gly Asp His Val Gly Val Tyr Cys Glu Asn
            340                 345                 350

Leu Ala Glu Thr Val Glu Glu Ala Leu Glu Leu Leu Gly Leu Ser Pro
```

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        355                 360                 365

Asp Thr Tyr Phe Ser Val His Ala Asp Lys Glu Asp Gly Thr Pro Leu
    370                 375                 380

Ser Gly Ser Ser Leu Pro Pro Pro Phe Pro Pro Cys Thr Leu Arg Thr
385                 390                 395                 400

Ala Leu Thr Leu His Ala Asp Leu Leu Ser Ser Pro Lys Lys Ser Ala
                405                 410                 415

Leu Leu Ala Leu Ala Ala His Ala Ser Asp Pro Thr Glu Ala Asp Arg
            420                 425                 430

Leu Arg His Leu Ala Ser Pro Ala Gly Lys Asp Glu Tyr Ala Gln Trp
        435                 440                 445

Ile Val Ala Ser Gln Arg Ser Leu Leu Glu Val Met Ala Glu Phe Pro
    450                 455                 460

Ser Ala Lys Pro Pro Leu Gly Val Phe Phe Ala Ser Val Ala Pro Arg
465                 470                 475                 480

Leu Gln Pro Arg Tyr Tyr Ser Ile Ser Ser Ser Pro Arg Ile Ala Pro
                485                 490                 495

Ser Arg Ile His Val Thr Cys Ala Leu Val Tyr Glu Lys Thr Pro Thr
            500                 505                 510

Gly Arg Val His Lys Gly Val Cys Ser Thr Trp Met Lys Asn Ser Val
        515                 520                 525

Pro Ser Glu Lys Ser Asp Glu Cys Ser Trp Ala Pro Ile Phe Val Arg
    530                 535                 540

Gln Ser Asn Phe Lys Leu Pro Ala Asp Ala Lys Val Pro Ile Ile Met
545                 550                 555                 560

Ile Gly Pro Gly Thr Gly Leu Ala Pro Phe Arg Gly Phe Leu Gln Glu
                565                 570                 575
```

```
Arg Leu Ala Leu Lys Glu Ala Gly Thr Glu Leu Gly Pro Ser Ile Leu
            580                 585                 590

Phe Phe Gly Cys Arg Asn Ser Lys Met Asp Tyr Ile Tyr Glu Asp Glu
        595                 600                 605

Leu Asp Asn Phe Val Gln Asn Gly Ala Leu Ser Glu Leu Val Leu Ala
    610                 615                 620

Phe Ser Arg Glu Gly Pro Thr Lys Glu Tyr Val Gln His Lys Met Met
625                 630                 635                 640

Glu Lys Ala Ser Asp Ile Trp Asn Leu Ile Ser Gln Gly Ala Tyr Leu
                645                 650                 655

Tyr Val Cys Gly Asp Ala Lys Gly Met Ala Arg Asp Val His Arg Thr
            660                 665                 670

Leu His Thr Ile Ala Gln Glu Gln Gly Ser Leu Asp Ser Ser Lys Ala
        675                 680                 685

Glu Ser Met Val Lys Asn Leu Gln Met Ser Gly Arg Tyr Leu Arg Asp
    690                 695                 700

Val Trp
705
```

<210> 83
<211> 2121
<212> DNA
<213> Pelargonium graveolens

<400> 83

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atggcgcagt caagcagtgg atcaatgagc cctttcgatt ttatgaccgc tataataaaa       60

ggtaaaatgg agccaagtaa tgcgtcttta ggagcggcag gtgaagtcac agcaatgata      120

cttgataata gggagctggt tatgattctg acgaccagca ttgcagtgct gatcggttgc      180

gttgtagtgt tcatttggcg tcgttcatca tcccagaccc ctaccgcggt gcagccatta      240

aaaccacttt tagcgaagga aacagagagc gaagtagacg atggcaaaca gaaagtaact      300

atctttttg gtactcaaac tggaaccgct gaaggtttcg cgaaagcgct cgcagacgag      360
```

gccaaagcac ggtatgataa agtcactttt aaagtggttg atctggacga ttatgccgca 420

gatgacgaag aatatgaaga aaagctgaag aaggaaacgt tagcattctt ttttcttgcg 480

acgtatggag atggtgaacc tactgacaat gctgcaaggt tttataagtg gtttctggaa 540

ggtaaagaac gcggagaatg gcttcagaat ctaaaatttg gtgtgtttgg tttaggcaac 600

cgtcagtatg agcatttcaa taaaattgcc attgtggttg atgaaatcct tgcagaacaa 660

ggtggtaagc gtctcatttc agttggcctg ggcgatgatg atcagtgtat tgaggatgac 720

tttactgcct ggagggaatc gctgtggccg gagctagatc agttattacg cgatgaggat 780

gatactacgg tttctacgcc gtataccgcc gcggtgctgg aatacagagt cgtttttcat 840

gatccggcag atgccccaac tctcgaaaaa agctacagca acgctaacgg gcatagcgtg 900

gttgatgcgc aacatccgtt acgggcaaat gttgccgtca gacgggagtt gcatactcct 960

gcgtctgacc gctcatgtac ccatctggaa tttgatatat ctggtactgg catcgcatac 1020

gagacgggtg atcatgttgg cgtgtattgc gagaatcttg cagagacggt agaagaagcg 1080

ttggaacttt taggtctttc cccggataca tacttctccg tacacgcaga taaagaggac 1140

ggtacgcctc tctcaggctc atctctcccg ccgccatttc caccgtgcac tttacgtaca 1200

gccctgacgt tacatgctga cttactgtct tccccaaaga aatctgcatt gctcgcgctt 1260

gcagctcatg catcagaccc cactgaagct gatcgattgc ggcacctagc aagccctgcg 1320

ggcaaggacg aatacgctca gtggatagtt gctagtcagc gttccttgct ggaagtgatg 1380

gcggagttcc ccagtgccaa gcccccgctg ggagtattct tcgcatcggt tgctccaaga 1440

ttgcagcccc ggtactactc tatttcttct tccccaagaa tagcgccgtc tcgcatacac 1500

gtgacctgcg cgttagttta cgagaaaaca cctacgggca gagtacacaa aggagtttgc 1560

tccacttgga tgaaaaactc agtgccctct gaaaagagtg atgaatgttc atgggcacca 1620

attttcgtac gacagagcaa ctttaaactg cccgccgatg cgaaagtacc cataattatg 1680

attggtccag gaacgggtct ggcaccattt cgcggcttcc tccaggagcg gcttgcattg 1740

aaagaagcag ggacagaact gggaccttcc atattatttt ttgggtgccg caacagcaaa 1800

atggactata tatacgagga tgaactggat aattttgtac agaatggggc actctctgaa 1860

ctcgtgttgg cgttctcacg tgaaggtcct accaaagagt atgtgcaaca taagatgatg 1920

gagaaagcct cagatatatg gaaccttatt tcacagggag cttatttgta tgtgtgcggg 1980

gacgcaaaag gcatggcgcg tgatgtgcac cgcacgttac ataccatcgc tcaggagcag 2040

gggtcattag atagctcaaa agcagagagt atggtgaaga atcttcagat gtcaggcaga 2100

tacctgcgcg atgtctggta a 2121

<210> 84
<211> 277
<212> PRT
<213> Rhodococcus erythropolis

<400> 84

Met Ala Arg Val Glu Gly Gln Val Ala Leu Ile Thr Gly Ala Ala Arg
1 5 10 15

Gly Gln Gly Arg Ser His Ala Ile Lys Leu Ala Glu Glu Gly Ala Asp
20 25 30

Val Ile Leu Val Asp Val Pro Asn Asp Val Val Asp Ile Gly Tyr Pro
35 40 45

Leu Gly Thr Ala Asp Glu Leu Asp Gln Thr Ala Lys Asp Val Glu Asn
50 55 60

Leu Gly Arg Lys Ala Ile Val Ile His Ala Asp Val Arg Asp Leu Glu
65 70 75 80

Ser Leu Thr Ala Glu Val Asp Arg Ala Val Ser Thr Leu Gly Arg Leu
85 90 95

Asp Ile Val Ser Ala Asn Ala Gly Ile Ala Ser Val Pro Phe Leu Ser
100 105 110

His Asp Ile Pro Asp Asn Thr Trp Arg Gln Met Ile Asp Ile Asn Leu
115 120 125

Thr Gly Val Trp His Thr Ala Lys Val Ala Val Pro His Ile Leu Ala
130 135 140

Gly Glu Arg Gly Gly Ser Ile Val Leu Thr Ser Ser Ala Ala Gly Leu
145 150 155 160

```
Lys Gly Tyr Ala Gln Ile Ser His Tyr Ser Ala Ala Lys His Gly Val
                165                 170                 175

Val Gly Leu Met Arg Ser Leu Ala Leu Glu Leu Ala Pro His Arg Val
            180                 185                 190

Arg Val Asn Ser Leu His Pro Thr Gln Val Asn Thr Pro Met Ile Gln
        195                 200                 205

Asn Glu Gly Thr Tyr Arg Ile Phe Ser Pro Asp Leu Glu Asn Pro Thr
    210                 215                 220

Arg Glu Asp Phe Glu Ile Ala Ser Thr Thr Thr Asn Ala Leu Pro Ile
225                 230                 235                 240

Pro Trp Val Glu Ser Val Asp Val Ser Asn Ala Leu Leu Phe Leu Val
                245                 250                 255

Ser Glu Asp Ala Arg Tyr Ile Thr Gly Ala Ala Ile Pro Val Asp Ala
            260                 265                 270

Gly Thr Thr Leu Lys
        275
```

<210> 85
<211> 834
<212> DNA
<213> Rhodococcus erythropolis

<400> 85

```
atggcccgtg tggaaggtca agtggctctg attaccggcg ctgctcgtgg tcaaggtcgt       60

agtcatgcga ttaaactggc ggaagaaggc gcggatgtga ttctggttga cgtcccgaat      120

gatgtggttg acatcggcta tccgctgggt acggcagatg aactggacca gaccgctaaa      180

gatgttgaaa acctgggtcg taaggcgatt gtcatccatg ccgatgtgcg cgacctggaa      240

tcactgacgg cagaagtgga tcgtgctgtt agtaccctgg gccgcctgga cattgtttcc      300

gcaaatgctg gtatcgccag cgtcccgttt ctgtctcacg atattccgga caacacctgg      360

cgtcagatga ttgatatcaa tctgacgggc gtctggcata ccgcgaaagt ggccgttccg      420

cacattctgg ccggtgaacg cggcggttcc atcgttctga ccagctctgc ggccggcctg      480
```

aaaggttatg cacaaattag tcattactcc gcagctaagc acggcgtcgt gggtctgatg 540

cgttcactgg cactggaact ggctccgcat cgtgtccgcg tgaactcgct gcacccgacg 600

caggtgaaca ccccgatgat tcaaaatgaa ggcacgtatc gtatctttag cccggatctg 660

gaaaacccga cccgcgaaga cttcgaaatt gcgtctacca cgaccaatgc cctgccgatc 720

ccgtgggtgg aatcagttga tgtctcgaac gcactgctgt tcctggttag cgaagacgca 780

cgttacatta ccggtgcagc aatcccggtg gatgccggta cgaccctgaa gtaa 834

<210> 86
<211> 280
<212> PRT
<213> Citrus sinensus

<400> 86

Met Ala Thr Pro Pro Ile Ser Ser Leu Ile Ser Gln Arg Leu Leu Gly
1 5 10 15

Lys Val Ala Leu Val Thr Gly Gly Ala Ser Gly Ile Gly Glu Gly Ile
20 25 30

Val Arg Leu Phe His Arg His Gly Ala Lys Val Cys Phe Val Asp Val
35 40 45

Gln Asp Glu Leu Gly Tyr Arg Leu Gln Glu Ser Leu Val Gly Asp Lys
50 55 60

Asp Ser Asn Ile Phe Tyr Ser His Cys Asp Val Thr Val Glu Asp Asp
65 70 75 80

Val Arg Arg Ala Val Asp Leu Thr Val Thr Lys Phe Gly Thr Leu Asp
85 90 95

Ile Met Val Asn Asn Ala Gly Ile Ser Gly Thr Pro Ser Ser Asp Ile
100 105 110

Arg Asn Val Asp Val Ser Glu Phe Glu Lys Val Phe Asp Ile Asn Val
115 120 125

Lys Gly Val Phe Met Gly Met Lys Tyr Ala Ala Ser Val Met Ile Pro

```
    130                 135                 140

Arg Lys Gln Gly Ser Ile Ile Ser Leu Gly Ser Val Gly Ser Val Ile
145                 150                 155                 160

Gly Gly Ile Gly Pro His His Tyr Ile Ser Ser Lys His Ala Val Val
                165                 170                 175

Gly Leu Thr Arg Ser Ile Ala Ala Glu Leu Gly Gln His Gly Ile Arg
            180                 185                 190

Val Asn Cys Val Ser Pro Tyr Ala Val Pro Thr Asn Leu Ala Val Ala
        195                 200                 205

His Leu Pro Glu Asp Glu Arg Thr Glu Asp Met Phe Thr Gly Phe Arg
    210                 215                 220

Glu Phe Ala Lys Lys Asn Ala Asn Leu Gln Gly Val Glu Leu Thr Val
225                 230                 235                 240

Glu Asp Val Ala Asn Ala Val Leu Phe Leu Ala Ser Glu Asp Ala Arg
                245                 250                 255

Tyr Ile Ser Gly Asp Asn Leu Ile Val Asp Gly Gly Phe Thr Arg Val
            260                 265                 270

Asn His Ser Phe Arg Val Phe Arg
        275                 280
```

<210> 87
<211> 843
<212> DNA
<213> Citrus sinensus

<400> 87

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atggcaacgc cgccgatttc atccctgatt tcacaacgcc tgctgggtaa agtcgccctg       60

gtcacgggtg gtgcttctgg tattggtgaa ggcatcgtgc gtctgtttca ccgtcatggc      120

gcgaaagtgt gctttgttga tgtgcaggat gaactgggct accgtctgca agaatctctg      180

gtgggcgaca aagattcaaa catcttttat agccactgtg atgtcaccgt ggaagacgat      240

gtgcgccgcg ctgtggatct gaccgtgacg aaattcggta cgctggatat tatggtcaat      300
```

aacgcgggta ttagtggcac cccgtccagc gatattcgta atgttgatgt gagcgaattt 360

gaaaaagtgt ttgatattaa cgtcaaaggc gtgtttatgg gcatgaaata tgccgcgagc 420

gtgatgatcc cgcgcaaaca gggtagcatc atctccctgg gttctgttgg cagcgtgatc 480

ggtggcattg gcccgcacca ttatatcagc tcgaaacatg cggttgtggg cctgacccgc 540

agcattgcag cggaactggg tcagcatggc attcgtgtga actgtgtgtc tccgtatgcg 600

gttccgacca atctggcggt tgcacacctg ccggaagatg aacgtaccga agatatgttt 660

acgggcttcc gtgaatttgc gaaaaagaat gccaacctgc aaggtgttga actgaccgtc 720

gaagatgtgg ccaatgcggt gctgtttctg gccagcgaag atgcacgcta cattagcggt 780

gataatctga tcgttgatgg cggctttacc cgtgtgaacc actcatttcg tgttttccgt 840

taa 843

<210> 88
<211> 262
<212> PRT
<213> Citrus sinensus

<400> 88

Met Ser Lys Pro Arg Leu Gln Gly Lys Val Ala Ile Ile Met Gly Ala
1 5 10 15

Ala Ser Gly Ile Gly Glu Ala Thr Ala Lys Leu Phe Ala Glu His Gly
20 25 30

Ala Phe Val Ile Ile Ala Asp Ile Gln Asp Glu Leu Gly Asn Gln Val
35 40 45

Val Ser Ser Ile Gly Pro Glu Lys Ala Ser Tyr Arg His Cys Asp Val
50 55 60

Arg Asp Glu Lys Gln Val Glu Glu Thr Val Ala Tyr Ala Ile Glu Lys
65 70 75 80

Tyr Gly Ser Leu Asp Ile Met Tyr Ser Asn Ala Gly Val Ala Gly Pro
85 90 95

Val Gly Thr Ile Leu Asp Leu Asp Met Ala Gln Phe Asp Arg Thr Ile

```
            100                 105                 110

Ala Thr Asn Leu Ala Gly Ser Val Met Ala Val Lys Tyr Ala Ala Arg
        115                 120                 125

Val Met Val Ala Asn Lys Ile Arg Gly Ser Ile Ile Cys Thr Thr Ser
    130                 135                 140

Thr Ala Ser Thr Val Gly Gly Ser Gly Pro His Ala Tyr Thr Ile Ser
145                 150                 155                 160

Lys His Gly Leu Leu Gly Leu Val Arg Ser Ala Ala Ser Glu Leu Gly
                165                 170                 175

Lys His Gly Ile Arg Val Asn Cys Val Ser Pro Phe Gly Val Ala Thr
            180                 185                 190

Pro Phe Ser Ala Gly Thr Ile Asn Asp Val Glu Gly Phe Val Cys Lys
        195                 200                 205

Val Ala Asn Leu Lys Gly Ile Val Leu Lys Ala Lys His Val Ala Glu
    210                 215                 220

Ala Ala Leu Phe Leu Ala Ser Asp Glu Ser Ala Tyr Val Ser Gly His
225                 230                 235                 240

Asp Leu Val Val Asp Gly Gly Phe Thr Ala Val Thr Asn Val Met Ser
                245                 250                 255

Met Leu Glu Gly His Gly
            260
```

<210> 89
<211> 789
<212> DNA
<213> Citrus sinensus

<400> 89

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atgtcaaaac cgcgtctgca aggcaaagtg gctattatta tgggtgctgc gtctggcatc       60

ggtgaagcta cggctaaact gttcgctgaa catggcgcat ttgtgattat cgctgatatt      120

caggacgaac tgggcaacca ggtggttagc tctatcggcc cggaaaaagc gtcttatcgt      180
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cactgcgatg tgcgtgatga aaaacaggtt gaagaaaccg tcgcgtatgc gattgaaaaa 240

tacggcagcc tggatattat gtactccaat gcgggcgtgg ccggtccggt tggcacgatt 300

ctggatctgg acatggccca attcgaccgt accatcgcaa cgaacctggc tggtagtgtt 360

atggcagtca aatatgcggc ccgtgtcatg gtggcgaata aaattcgcgg tagcattatc 420

tgtaccacga gtaccgcctc cacggtgggc ggcagcggcc cgcacgccta taccattagc 480

aaacacggtc tgctgggcct ggttcgttca gcagcttcgg aactgggtaa acatggcatc 540

cgcgtgaact gcgttagccc gtttggtgtt gcgaccccgt tctctgccgg tacgattaac 600

gatgtcgaag gctttgtctg taaagtggcg aatctgaaag gcatcgtcct gaaagcgaag 660

catgtggccg aagcggccct gttcctggca agcgatgaat ctgcttatgt gagcggtcac 720

gacctggtgg tggatggtgg ctttacggca gttacgaatg tcatgtcaat gctggaaggt 780

cacggctaa 789

<210> 90
<211> 263
<212> PRT
<213> Citrus sinensus

<400> 90

Met Ser Asn Pro Arg Met Glu Gly Lys Val Ala Leu Ile Thr Gly Ala
1 5 10 15

Ala Ser Gly Ile Gly Glu Ala Ala Val Arg Leu Phe Ala Glu His Gly
20 25 30

Ala Phe Val Val Ala Ala Asp Val Gln Asp Glu Leu Gly His Gln Val
35 40 45

Ala Ala Ser Val Gly Thr Asp Gln Val Cys Tyr His His Cys Asp Val
50 55 60

Arg Asp Glu Lys Gln Val Glu Glu Thr Val Arg Tyr Thr Leu Glu Lys
65 70 75 80

Tyr Gly Lys Leu Asp Val Leu Phe Ser Asn Ala Gly Ile Met Gly Pro
85 90 95

```
Leu Thr Gly Ile Leu Glu Leu Asp Leu Thr Gly Phe Gly Asn Thr Met
            100                 105                 110

Ala Thr Asn Val Cys Gly Val Ala Ala Thr Ile Lys His Ala Ala Arg
        115                 120                 125

Ala Met Val Asp Lys Asn Ile Arg Gly Ser Ile Ile Cys Thr Thr Ser
    130                 135                 140

Val Ala Ser Ser Leu Gly Gly Thr Ala Pro His Ala Tyr Thr Thr Ser
145                 150                 155                 160

Lys His Ala Leu Val Gly Leu Val Arg Thr Ala Cys Ser Glu Leu Gly
                165                 170                 175

Ala Tyr Gly Ile Arg Val Asn Cys Ile Ser Pro Phe Gly Val Ala Thr
            180                 185                 190

Pro Leu Ser Cys Thr Ala Tyr Asn Leu Arg Pro Asp Glu Val Glu Ala
        195                 200                 205

Asn Ser Cys Ala Leu Ala Asn Leu Lys Gly Ile Val Leu Lys Ala Lys
    210                 215                 220

His Ile Ala Glu Ala Ala Leu Phe Leu Ala Ser Asp Glu Ser Ala Tyr
225                 230                 235                 240

Ile Ser Gly His Asn Leu Ala Val Asp Gly Gly Phe Thr Val Val Asn
                245                 250                 255

His Ser Ser Ser Ser Ala Thr
            260
```

<210> 91
<211> 792
<212> DNA
<213> Citrus sinensus

<400> 91
atgtcaaacc cgcgtatgga aggcaaagtc gcactgatta cgggcgcagc atctggtatc 60

ggtgaagcag cagtccgtct gttcgctgaa catggtgcgt ttgtcgtggc ggcagatgtg 120

caagacgaac tgggtcatca ggtggcggca tctgtgggta cggaccaggt gtgctaccat 180

cactgcgatg tgcgcgatga aaaacaagtg gaagaaaccg tgcgttatac cctggaaaaa 240

tacggcaaac tggatgtcct gttttcaaac gcgggcatca tgggtccgct gaccggcatt 300

ctggaactgg atctgaccgg cttcggtaac acgatggcaa ccaatgtgtg cggtgttgcc 360

gcgaccatta aacacgcggc acgcgcaatg gtggacaaaa acattcgcgg tagcattatc 420

tgcaccacca gcgtggcttc atcgctgggt ggcaccgcgc cgcacgcata caccacgagc 480

aaacacgcac tggtgggcct ggttcgtacg gcatgttcgg aactgggtgc gtatggcatt 540

cgtgtgaact gtatcagccc gtttggtgtt gcaacgccgc tgtcttgcac ggcctataac 600

ctgcgcccgg atgaagtgga agcaaactca tgcgcactgg cgaacctgaa aggtattgtg 660

ctgaaagcga aacacattgc ggaagcagcg ctgttcctgg cgagcgatga aagcgcgtat 720

attagcggtc ataatctggc ggtggatggt ggtttcacgg tggttaatca ttcaagttcg 780

tcggcgacgt aa 792

<210> 92
<211> 278
<212> PRT
<213> Citrus sinensus

<400> 92

Met Thr Thr Ala Gly Ser Arg Asp Ser Pro Leu Val Ala Gln Arg Leu
1 5 10 15

Leu Gly Lys Val Ala Leu Val Thr Gly Gly Ala Thr Gly Ile Gly Glu
20 25 30

Ser Ile Val Arg Leu Phe His Lys His Gly Ala Lys Val Cys Val Val
35 40 45

Asp Ile Asn Asp Asp Leu Gly Gln His Leu Cys Gln Thr Leu Gly Pro
50 55 60

Thr Thr Arg Phe Ile His Gly Asp Val Ala Ile Glu Asp Asp Val Ser
65 70 75 80

Arg Ala Val Asp Phe Thr Val Ala Asn Phe Gly Thr Leu Asp Ile Met

```
                85                  90                  95

Val Asn Asn Ala Gly Met Gly Gly Pro Pro Cys Pro Asp Ile Arg Glu
            100                 105                 110

Phe Pro Ile Ser Thr Phe Glu Lys Val Phe Asp Ile Asn Thr Lys Gly
        115                 120                 125

Thr Phe Ile Gly Met Lys His Ala Ala Arg Val Met Ile Pro Ser Lys
    130                 135                 140

Lys Gly Ser Ile Val Ser Ile Ser Ser Val Thr Ser Ala Ile Gly Gly
145                 150                 155                 160

Ala Gly Pro His Ala Tyr Thr Ala Ser Lys His Ala Val Leu Gly Leu
                165                 170                 175

Thr Lys Ser Val Ala Ala Glu Leu Gly Gln His Gly Ile Arg Val Asn
            180                 185                 190

Cys Val Ser Pro Tyr Ala Ile Leu Thr Asn Leu Ala Leu Ala His Leu
        195                 200                 205

His Glu Asp Glu Arg Thr Asp Asp Ala Arg Ala Gly Phe Arg Ala Phe
    210                 215                 220

Ile Gly Lys Asn Ala Asn Leu Gln Gly Val Asp Leu Val Glu Asp Asp
225                 230                 235                 240

Val Ala Asn Ala Val Leu Phe Leu Ala Ser Asp Asp Ala Arg Tyr Ile
                245                 250                 255

Ser Gly Asp Asn Leu Phe Val Asp Gly Gly Phe Thr Cys Thr Asn His
            260                 265                 270

Ser Leu Arg Val Phe Arg
        275


<210>  93
<211>  837
<212>  DNA
```

<213> Citrus sinensus

<400> 93
atgacgacgg ctggttcgcg tgacagtccg ctggtcgctc aacgcctgct gggcaaagtg 60

gccctggtta cgggtggtgc taccggcatt ggtgaaagta tcgtgcgtct gtttcataaa 120

cacggcgcga aagtttgcgt ggttgatatt aacgatgacc tgggccagca tctgtgtcaa 180

accctgggtc cgaccacccg tttcattcac ggcgatgttg caatcgaaga tgatgtgagc 240

cgtgcggttg attttaccgt cgccaacttc ggtacgctgg acattatggt gaacaatgcc 300

ggtatgggcg gtccgccgtg cccggatatt cgtgaatttc cgatctcgac ctttgaaaaa 360

gtcttcgaca ttaacaccaa aggcacgttc atcggtatga aacatgcggc ccgcgtgatg 420

attccgagta aaaaaggtag tattgtcagc attagcagcg tgaccagcgc gattggcggc 480

gcgggtccgc acgcctatac cgcgagcaaa catgcggtgc tgggcctgac gaaatctgtc 540

gcggcggaac tgggccagca cggtattcgt gtcaactgtg tgtctccgta cgccatcctg 600

accaatctgg cgctggccca tctgcacgaa gatgaacgta cggatgacgc gcgtgcgggt 660

tttcgtgcat tcattggtaa aaacgctaat ctgcaaggtg ttgatctggt cgaagatgac 720

gtggcgaatg ccgttctgtt tctggcatca gatgacgctc gctatatctc gggcgataac 780

ctgttcgtgg atggcggctt cacctgtacc aatcactccc tgcgtgtgtt ccgttaa 837

<210> 94
<211> 280
<212> PRT
<213> Vitis vinifera

<400> 94

Met Ala Ala Thr Ser Ile Asp Asn Ser Pro Leu Pro Ser Gln Arg Leu
1 5 10 15

Leu Gly Lys Val Ala Leu Val Thr Gly Gly Ala Thr Gly Ile Gly Glu
20 25 30

Ser Ile Val Arg Leu Phe Leu Lys Gln Gly Ala Lys Val Cys Ile Val
35 40 45

Asp Val Gln Asp Asp Leu Gly Gln Lys Leu Cys Asp Thr Leu Gly Gly
50 55 60

```
Asp Pro Asn Val Ser Phe Phe His Cys Asp Val Thr Ile Glu Asp Asp
65                  70                  75                  80

Val Cys His Ala Val Asp Phe Thr Val Thr Lys Phe Gly Thr Leu Asp
                85                  90                  95

Ile Met Val Asn Asn Ala Gly Met Ala Gly Pro Pro Cys Ser Asp Ile
            100                 105                 110

Arg Asn Val Glu Val Ser Met Phe Glu Lys Val Phe Asp Val Asn Val
        115                 120                 125

Lys Gly Val Phe Leu Gly Met Lys His Ala Ala Arg Ile Met Ile Pro
    130                 135                 140

Leu Lys Lys Gly Thr Ile Ile Ser Leu Cys Ser Val Ser Ser Ala Ile
145                 150                 155                 160

Ala Gly Val Gly Pro His Ala Tyr Thr Gly Ser Lys Cys Ala Val Ala
                165                 170                 175

Gly Leu Thr Gln Ser Val Ala Ala Glu Met Gly Gly His Gly Ile Arg
            180                 185                 190

Val Asn Cys Ile Ser Pro Tyr Ala Ile Ala Thr Gly Leu Ala Leu Ala
        195                 200                 205

His Leu Pro Glu Asp Glu Arg Thr Glu Asp Ala Met Ala Gly Phe Arg
    210                 215                 220

Ala Phe Val Gly Lys Asn Ala Asn Leu Gln Gly Val Glu Leu Thr Val
225                 230                 235                 240

Asp Asp Val Ala His Ala Ala Val Phe Leu Ala Ser Asp Glu Ala Arg
                245                 250                 255

Tyr Ile Ser Gly Leu Asn Leu Met Leu Asp Gly Gly Phe Ser Cys Thr
            260                 265                 270

Asn His Ser Leu Arg Val Phe Arg
```

275 280

<210> 95
<211> 843
<212> DNA
<213> Vitis vinifera

<400> 95
atggccgcaa cgagcattga taattctccg ctgccgagtc aacgtctgct gggtaaagtc 60

gcactggtca cgggtggcgc tacgggtatt ggcgaaagca tcgtgcgtct gtttctgaaa 120

cagggtgcta aagtgtgcat tgtggacgtg caagatgacc tgggccagaa actgtgcgat 180

accctgggtg gcgatccgaa cgttagcttt ttccattgcg atgtgaccat cgaagatgat 240

gtgtgccatg cagttgattt taccgtcacg aaattcggca ccctggatat tatggtgaac 300

aatgcgggta tggcaggtcc gccgtgctcg gacatccgca acgtggaagt cagcatgttt 360

gaaaaagtgt ttgatgtgaa tgtgaaaggt gttttcctgg gcatgaaaca tgcagcccgc 420

attatgattc cgctgaaaaa aggcaccatt atcagcctgt gttcagtttc cagcgctatc 480

gcgggcgttg gtccgcacgc atatacgggt agcaaatgcg cagtggcggg tctgacgcaa 540

tcggtcgcag cagaaatggg tggtcatggc attcgcgtga actgtatcag cccgtatgca 600

atcgcaacgg gtctggcgct ggcacatctg ccggaagatg aacgcacgga agatgcaatg 660

gcgggtttcc gtgcgtttgt gggtaaaaat gcgaatctgc aaggtgttga actgaccgtg 720

gatgatgtgg cgcacgcagc ggtgtttctg gcaagcgatg aagcacgtta catctctggt 780

ctgaatctga tgctggacgg cggcttttcg tgtaccaacc actcgctgcg tgtctttcgc 840

taa 843

<210> 96
<211> 279
<212> PRT
<213> Vitis vinifera

<400> 96

Met Ser Thr Ala Ser Ser Gly Asp Val Ser Leu Leu Ser Gln Arg Leu
1 5 10 15

Val Gly Lys Val Ala Leu Ile Thr Gly Gly Ala Thr Gly Ile Gly Glu
20 25 30

```
Ser Ile Ala Arg Leu Phe Tyr Arg His Gly Ala Lys Val Cys Ile Val
        35                  40                  45

Asp Ile Gln Asp Asn Pro Gly Gln Asn Leu Cys Arg Glu Leu Gly Thr
    50                  55                  60

Asp Asp Ala Cys Phe Phe His Cys Asp Val Ser Ile Glu Ile Asp Val
65                  70                  75                  80

Ile Arg Ala Val Asp Phe Val Val Asn Arg Phe Gly Lys Leu Asp Ile
                85                  90                  95

Met Val Asn Asn Ala Gly Ile Ala Asp Pro Pro Cys Pro Asp Ile Arg
            100                 105                 110

Asn Thr Asp Leu Ser Ile Phe Glu Lys Val Phe Asp Val Asn Val Lys
        115                 120                 125

Gly Thr Phe Gln Cys Met Lys His Ala Ala Arg Val Met Val Pro Gln
    130                 135                 140

Lys Lys Gly Ser Ile Ile Ser Leu Thr Ser Val Ala Ser Val Ile Gly
145                 150                 155                 160

Gly Ala Gly Pro His Ala Tyr Thr Gly Ser Lys His Ala Val Leu Gly
                165                 170                 175

Leu Thr Lys Ser Val Ala Ala Glu Leu Gly Leu His Gly Ile Arg Val
            180                 185                 190

Asn Cys Val Ser Pro Tyr Ala Val Pro Thr Gly Met Pro Leu Ala His
        195                 200                 205

Leu Pro Glu Ser Glu Lys Thr Glu Asp Ala Met Met Gly Met Arg Ala
    210                 215                 220

Phe Val Gly Arg Asn Ala Asn Leu Gln Gly Ile Glu Leu Thr Val Asp
225                 230                 235                 240

Asp Val Ala Asn Ser Val Val Phe Leu Ala Ser Asp Glu Ala Arg Tyr
```

245 250 255

Val Ser Gly Leu Asn Leu Met Leu Asp Gly Gly Phe Ser Cys Val Asn
260 265 270

His Ser Leu Arg Val Phe Arg
275

<210> 97
<211> 840
<212> DNA
<213> Vitis vinifera

<400> 97
atgtcaacgg cttcctcggg tgatgtgtcg ctgctgtcgc aacgcctggt cggtaaagtc 60

gctctgatta cgggtggtgc aacgggcatt ggtgaatcga ttgcgcgtct gttttaccgt 120

catggtgcga aagtgtgcat cgttgacatt caggataatc cgggtcaaaa cctgtgccgt 180

gaactgggca ccgacgatgc gtgcttcttt cactgcgatg tgagcattga aatcgatgtg 240

attcgtgctg ttgactttgt ggttaaccgc tttggtaaac tggacattat ggttaataac 300

gcgggcatcg cagatccgcc gtgcccggat attcgcaaca ccgatctgag cattttgaa 360

aaagtgttcg atgtgaacgt gaaaggcacc tttcagtgta tgaaacacgc agcgcgcgtt 420

atggtgccgc agaaaaaagg tagcattatc agcctgacct cggtggcgag cgtgattggt 480

ggcgcgggtc cgcacgccta tacgggtagc aaacacgcgg ttctgggtct gacgaaaagc 540

gttgcggcag aactgggtct gcatggtatt cgcgtgaact gtgtgagtcc gtatgcagtt 600

ccgacgggta tgccgctggc acatctgccg gaatcggaaa aaaccgaaga tgcgatgatg 660

ggtatgcgtg catttgtggg tcgtaatgcc aacctgcaag gtattgaact gaccgtggac 720

gatgtcgcaa atagcgtcgt gtttctggcg tcggatgaag cgcgttatgt tagcggtctg 780

aacctgatgc tggacggcgg cttctcgtgt gtcaaccact cgctgcgtgt gtttcgctaa 840

<210> 98
<211> 280
<212> PRT
<213> Citrus sinensus

<400> 98

Met Ser Asn Ser Asn Ser Thr Asp Ser Ser Pro Ala Val Gln Arg Leu

```
1               5                   10                  15

Val Gly Arg Val Ala Leu Ile Thr Gly Gly Ala Thr Gly Ile Gly Glu
            20                  25                  30

Ser Thr Val Arg Leu Phe His Lys His Gly Ala Lys Val Cys Ile Ala
        35                  40                  45

Asp Val Gln Asp Asn Leu Gly Gln Gln Val Cys Gln Ser Leu Gly Gly
    50                  55                  60

Glu Pro Asp Thr Phe Phe Cys His Cys Asp Val Thr Lys Glu Glu Asp
65                  70                  75                  80

Val Cys Ser Ala Val Asp Leu Thr Val Glu Lys Phe Gly Thr Leu Asp
                85                  90                  95

Ile Met Val Asn Asn Ala Gly Ile Ser Gly Ala Pro Cys Pro Asp Ile
            100                 105                 110

Arg Glu Ala Asp Leu Ser Glu Phe Glu Lys Val Phe Asp Ile Asn Val
        115                 120                 125

Lys Gly Val Phe His Gly Met Lys His Ala Ala Arg Ile Met Ile Pro
    130                 135                 140

Gln Thr Lys Gly Thr Ile Ile Ser Ile Cys Ser Val Ala Gly Ala Ile
145                 150                 155                 160

Gly Gly Leu Gly Pro His Ala Tyr Thr Gly Ser Lys His Ala Val Leu
                165                 170                 175

Gly Leu Asn Lys Asn Val Ala Ala Glu Leu Gly Lys Tyr Gly Ile Arg
            180                 185                 190

Val Asn Cys Val Ser Pro Tyr Ala Val Ala Thr Gly Leu Ala Leu Ala
        195                 200                 205

His Leu Pro Glu Glu Glu Arg Thr Glu Asp Ala Met Val Gly Phe Arg
    210                 215                 220
```

Asn Phe Val Ala Arg Asn Ala Asn Met Gln Gly Thr Glu Leu Thr Ala
225 230 235 240

Asn Asp Val Ala Asn Ala Val Leu Phe Leu Ala Ser Asp Glu Ala Arg
245 250 255

Tyr Ile Ser Gly Thr Asn Leu Met Val Asp Gly Gly Phe Thr Ser Val
260 265 270

Asn His Ser Leu Arg Val Phe Arg
275 280

<210> 99
<211> 843
<212> DNA
<213> Citrus sinensus

<400> 99
atgtccaata gcaactctac ggattcgtcg ccggcagtcc aacgcctggt cggtcgtgtc 60

gccctgatta cgggtggtgc aacgggtatt ggcgaaagca cggtgcgcct gtttcataaa 120

catggcgcga aagtgtgtat tgccgacgtt caggataacc tgggtcagca agtgtgtcag 180

agtctgggtg gcgaaccgga taccttttttc tgccattgtg atgtgacgaa agaagaagat 240

gtgtgtagcg cagttgatct gaccgtggaa aaatttggca ccctggacat tatggtgaac 300

aatgcgggta ttagcggcgc accgtgcccg gacattcgtg aagccgatct gagcgaattt 360

gaaaaagttt tcgacatcaa cgtgaaaggc gtgtttcacg gcatgaaaca tgcagcgcgt 420

attatgatcc cgcaaaccaa aggcaccatt atcagcattt gctccgtggc tggtgcgatt 480

ggtggcctgg gtccgcacgc atataccggc tccaaacatg cagtcctggg cctgaacaaa 540

aacgtggccg cggaactggg caaatacggt atccgtgtga attgcgtcag cccgtatgct 600

gttgccaccg gcctggctct ggcacacctg ccggaagaag aacgtaccga agatgcaatg 660

gtgggctttc gtaattttgt ggcacgcaac gcgaatatgc aaggcaccga actgacggcg 720

aatgatgtgg caaacgcggt cctgtttctg gcctctgatg aagcccgtta tatcagcggc 780

acgaatctga tggtggatgg cggttttacc tcggtcaatc actcgctgcg tgtcttccgt 840

taa 843

<210> 100
<211> 282
<212> PRT
<213> Brachypodium distachyon

<400> 100

Met Ser Ala Ala Ala Ala Val Ser Ser Ser Ser Ser Pro Arg Leu Glu
1 5 10 15

Gly Lys Val Ala Leu Val Thr Gly Gly Ala Ser Gly Ile Gly Glu Ala
20 25 30

Ile Val Arg Leu Phe Arg Gln His Gly Ala Lys Val Cys Ile Ala Asp
35 40 45

Val Gln Asp Glu Ala Gly Gln Gln Val Arg Asp Ser Leu Gly Asp Asp
50 55 60

Ala Gly Thr Asp Val Leu Phe Val His Cys Asp Val Thr Val Glu Glu
65 70 75 80

Asp Val Ser Arg Ala Val Asp Ala Ala Ala Glu Lys Phe Gly Thr Leu
85 90 95

Asp Ile Met Val Asn Asn Ala Gly Ile Thr Gly Asp Lys Val Thr Asp
100 105 110

Ile Arg Asn Leu Asp Phe Ala Glu Val Arg Lys Val Phe Asp Ile Asn
115 120 125

Val His Gly Met Leu Leu Gly Met Lys His Ala Ala Arg Val Met Ile
130 135 140

Pro Gly Lys Lys Gly Ser Ile Val Ser Leu Ala Ser Val Ala Ser Val
145 150 155 160

Met Gly Gly Met Gly Pro His Ala Tyr Thr Ala Ser Lys His Ala Val
165 170 175

Val Gly Leu Thr Lys Ser Val Ala Leu Glu Leu Gly Lys His Gly Ile
180 185 190

```
Arg Val Asn Cys Val Ser Pro Tyr Ala Val Pro Thr Ala Leu Ser Met
        195                 200                 205

Pro His Leu Pro Gln Gly Glu His Lys Gly Asp Ala Val Arg Asp Phe
    210                 215                 220

Leu Ala Phe Val Gly Gly Glu Ala Asn Leu Lys Gly Val Asp Leu Leu
225                 230                 235                 240

Pro Lys Asp Val Ala Gln Ala Val Leu Tyr Leu Ala Ser Asp Glu Ala
                245                 250                 255

Arg Tyr Ile Ser Ala Leu Asn Leu Val Val Asp Gly Gly Phe Thr Ser
            260                 265                 270

Val Asn Pro Asn Leu Lys Ala Phe Glu Asp
        275                 280
```

<210> 101
<211> 849
<212> DNA
<213> Brachypodium distachyon

<400> 101

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atgtccgctg ctgccgccgt gtcctcctca tcgtcgccgc gtctggaagg caaagtcgct       60

ctggttacgg gtggtgcgtc aggtatcggc gaagccattg tgcgcctgtt ccgtcaacat      120

ggtgccaaag tgtgtatcgc ggatgtccaa gacgaagcgg gccaacaggt ccgtgatagc      180

ctgggtgacg atgccggtac ggatgtgctg tttgtgcatt gcgacgttac cgtggaagaa      240

gatgtgtcac gcgcggtgga tgccgctgcg gaaaaattcg gcaccctgga cattatggtg      300

aacaacgcag gtattacggg cgacaaagtg acggacattc gcaacctgga tttcgctgaa      360

gtccgtaaag tgttcgacat caatgtgcac ggtatgctgc tgggcatgaa acatgcggcc      420

cgcgtgatga ttccgggtaa aaaaggctcg attgtgagcc tggcatcggt cgcaagcgtt      480

atgggtggta tgggtccgca cgcatatacc gcaagcaaac acgcggttgt gggtctgacg      540

aaaagcgttg cactggaact gggcaaacat ggtattcgtg tcaactgtgt gagcccgtat      600

gcagttccga ccgcactgtc aatgccgcac ctgccgcagg gcgaacataa aggtgatgcg      660

gtgcgtgatt tcctggcgtt tgttggcggt gaagcgaatc tgaaaggtgt cgatctgctg      720
```

ccgaaagatg ttgcacaggc ggttctgtat ctggcaagcg acgaagcgcg ctatatttct 780

gcgctgaatc tggtggttga tggcggtttt acgagcgtga atccgaatct gaaagcattt 840

gaagactaa 849

<210> 102
<211> 267
<212> PRT
<213> Zingiber zerumbet

<400> 102

Met Arg Leu Glu Gly Lys Val Ala Leu Val Thr Gly Gly Ala Ser Gly
1 5 10 15

Ile Gly Glu Ser Ile Ala Arg Leu Phe Ile Glu His Gly Ala Lys Ile
20 25 30

Cys Ile Val Asp Val Gln Asp Glu Leu Gly Gln Gln Val Ser Gln Arg
35 40 45

Leu Gly Gly Asp Pro His Ala Cys Tyr Phe His Cys Asp Val Thr Val
50 55 60

Glu Asp Asp Val Arg Arg Ala Val Asp Phe Thr Ala Glu Lys Tyr Gly
65 70 75 80

Thr Ile Asp Ile Met Val Asn Asn Ala Gly Ile Thr Gly Asp Lys Val
85 90 95

Ile Asp Ile Arg Asp Ala Asp Phe Asn Glu Phe Lys Lys Val Phe Asp
100 105 110

Ile Asn Val Asn Gly Val Phe Leu Gly Met Lys His Ala Ala Arg Ile
115 120 125

Met Ile Pro Lys Met Lys Gly Ser Ile Val Ser Leu Ala Ser Val Ser
130 135 140

Ser Val Ile Ala Gly Ala Gly Pro His Gly Tyr Thr Gly Ala Lys His
145 150 155 160

Ala Val Val Gly Leu Thr Lys Ser Val Ala Ala Glu Leu Gly Arg His
165 170 175

Gly Ile Arg Val Asn Cys Val Ser Pro Tyr Ala Val Pro Thr Arg Leu
180 185 190

Ser Met Pro Tyr Leu Pro Glu Ser Glu Met Gln Glu Asp Ala Leu Arg
195 200 205

Gly Phe Leu Thr Phe Val Arg Ser Asn Ala Asn Leu Lys Gly Val Asp
210 215 220

Leu Met Pro Asn Asp Val Ala Glu Ala Val Leu Tyr Leu Ala Thr Glu
225 230 235 240

Glu Ser Lys Tyr Val Ser Gly Leu Asn Leu Val Ile Asp Gly Gly Phe
245 250 255

Ser Ile Ala Asn His Thr Leu Gln Val Phe Glu
260 265

<210> 103
<211> 804
<212> DNA
<213> Zingiber zerumbet

<400> 103
atgcgtctgg aaggcaaagt ggctctggtc acgggcggtg cgtcgggtat tggcgaatct 60

attgctcgtc tgtttattga acacggtgca aaaatttgca tcgtggatgt ccaggatgaa 120

ctgggtcaac aggtctctca gcgtctgggt ggcgatccgc acgcctgtta tttccactgt 180

gatgtgaccg tggaagatga cgttcgtcgc gcggtggatt ttacggcgga aaaatatggc 240

accattgaca ttatggttaa caatgcgggc attacgggcg ataaagtgat cgatattcgt 300

gatgcggatt tcaacgaatt taaaaaagtg ttcgacatta acgtgaatgg tgtctttctg 360

ggcatgaaac acgcagcgcg tattatgatc ccgaaaatga aaggctccat cgtttcgctg 420

gcgtccgtta gctcggtgat tgctggtgca ggtccgcatg gctataccgg cgcaaaacat 480

gcggttgtgg gtctgaccaa aagcgttgca gccgaactgg gtcgtcatgg tattcgcgtg 540

aactgcgttt cgccgtatgc ggtgccgacg cgcctgtcaa tgccgtatct gccggaatcg 600

gaaatgcagg aagatgcact gcgcggcttt ctgacctttg tgcgtagcaa tgcgaacctg 660

aaaggcgttg atctgatgcc gaatgatgtg gcggaagctg ttctgtatct ggcgaccgaa 720

gaaagcaaat atgtttcagg tctgaatctg gttattgacg gcggcttctc catcgctaat 780

cataccctgc aagtgtttga ataa 804

<210> 104
<211> 505
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 104

Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1 5 10 15

Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
20 25 30

Arg Ser Gln Ser Asn Arg Leu Pro Arg Val Pro Glu Val Pro Gly Val
35 40 45

Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
50 55 60

Thr Phe Thr Arg Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65 70 75 80

Thr Gly Ala Thr Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys
85 90 95

Glu Ala Leu Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
100 105 110

Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser
115 120 125

Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
130 135 140

```
Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145                 150                 155                 160

Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175

Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190

Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205

Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240

Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255

Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu Gln Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300

Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350
```

```
Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Ile Pro Leu
    370                 375                 380

Arg His Val His Glu Asp Thr Gln Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400

Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415

Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430

Asn Glu Thr Ala Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
        435                 440                 445

Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Thr Ala Ser Ile Gly
    450                 455                 460

Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Asp
465                 470                 475                 480

Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
                485                 490                 495

Leu Arg Ala Ile Ile Lys Pro Arg Ile
            500                 505
```

<210> 105
<211> 505
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 105

```
Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1               5                   10                  15
```

```
Gly Ala Val Ala Met Arg Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg
            20                  25                  30

Arg Ser Gln Ser Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val
        35                  40                  45

Pro Leu Leu Gly Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met
    50                  55                  60

Thr Phe Thr Lys Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys
65                  70                  75                  80

Thr Gly Ala Thr Ser Val Val Val Val Ser Ser Asn Glu Ile Ala Lys
                85                  90                  95

Glu Ala Leu Val Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser
            100                 105                 110

Lys Ala Leu Lys Val Leu Thr Ala Asp Lys Gln Met Val Ala Met Ser
        115                 120                 125

Asp Tyr Asp Asp Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala
    130                 135                 140

Val Leu Gly Pro Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile
145                 150                 155                 160

Met Met Asp Asn Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn
                165                 170                 175

Pro Glu Gln Glu Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu
            180                 185                 190

Phe Gly Leu Ala Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu
        195                 200                 205

Tyr Val Glu Asp Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Leu Gln
    210                 215                 220

Val Leu Val Val Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg
225                 230                 235                 240
```

```
Asp Phe Phe Pro Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn
                245                 250                 255

Thr Ile Gln Gln Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu
            260                 265                 270

Ile Lys Glu Gln Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser
        275                 280                 285

Tyr Ile Asp Tyr Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln
    290                 295                 300

Leu Leu Met Ser Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr
305                 310                 315                 320

Met Val Thr Thr Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys
                325                 330                 335

Leu Gln Asp Arg Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu
            340                 345                 350

Lys Ile Thr Glu Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile
        355                 360                 365

Phe His Glu Thr Leu Arg Lys His Ser Pro Val Pro Ile Leu Pro Leu
    370                 375                 380

Arg His Val His Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala
385                 390                 395                 400

Gly Thr Glu Leu Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn
                405                 410                 415

Val Trp Glu Asn Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu
            420                 425                 430

Asn Glu Thr Ile Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys
        435                 440                 445
```

Arg Val Cys Ala Gly Ser Leu Gln Ala Leu Leu Ile Ala Ser Ile Gly
450 455 460

Ile Gly Arg Met Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr
465 470 475 480

Gln Glu Glu Val Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro
485 490 495

Leu Arg Ala Ile Ile Lys Pro Arg Ile
500 505

<210> 106
<211> 501
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 106

Met Ala Leu Leu Leu Ala Val Phe Ala Val Ala Leu Ala Val Ala Leu
1 5 10 15

Ile Phe Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser
20 25 30

Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly
35 40 45

Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg
50 55 60

Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr
65 70 75 80

Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val
85 90 95

Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys
100 105 110

```
Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp
        115                 120                 125

Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro
    130                 135                 140

Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn
145                 150                 155                 160

Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu
                165                 170                 175

Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala
            180                 185                 190

Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp
        195                 200                 205

Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val
    210                 215                 220

Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro
225                 230                 235                 240

Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln
                245                 250                 255

Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His
            260                 265                 270

Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr
        275                 280                 285

Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser
    290                 295                 300

Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr
305                 310                 315                 320

Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg
                325                 330                 335
```

```
Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu
            340                 345                 350

Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr
        355                 360                 365

Leu Arg Arg His Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His
    370                 375                 380

Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu
385                 390                 395                 400

Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn
                405                 410                 415

Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile
            420                 425                 430

Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala
        435                 440                 445

Gly Ser Leu Gln Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met
    450                 455                 460

Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val
465                 470                 475                 480

Asn Thr Ile Gly Leu Thr Thr Gln Met Leu Arg Pro Leu Arg Ala Ile
                485                 490                 495

Ile Lys Pro Arg Ile
            500
```

<210> 107
<211> 501
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 107

```
Met Ala Leu Leu Leu Ala Val Phe Ala Val Ala Leu Ala Val Ala Leu
1               5                  10                  15

Ile Phe Trp Tyr Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser
            20                  25                  30

Asn His Leu Pro Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly
        35                  40                  45

Asn Leu Leu Gln Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg
    50                  55                  60

Trp Ala Ala Thr Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr
65                  70                  75                  80

Ser Met Val Val Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val
                85                  90                  95

Thr Arg Phe Gln Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys
            100                 105                 110

Val Leu Thr Ala Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp
        115                 120                 125

Tyr His Lys Thr Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro
    130                 135                 140

Asn Ala Gln Lys Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn
145                 150                 155                 160

Ile Ser Thr Gln Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu
                165                 170                 175

Glu Val Asp Leu Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala
            180                 185                 190

Met Arg Gln Ala Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp
        195                 200                 205
```

```
Leu Lys Ile Thr Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val
    210                 215                 220

Asp Pro Met Met Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro
225                 230                 235                 240

Tyr Leu Lys Trp Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln
                245                 250                 255

Met Tyr Ile Arg Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His
            260                 265                 270

Lys Lys Arg Ile Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr
        275                 280                 285

Leu Leu Ser Glu Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser
    290                 295                 300

Leu Trp Glu Pro Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr
305                 310                 315                 320

Glu Trp Ala Met Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg
                325                 330                 335

Leu Tyr Arg Asp Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu
            340                 345                 350

Glu His Leu Ser Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr
        355                 360                 365

Leu Arg Arg His Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His
    370                 375                 380

Glu Asp Thr Val Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu
385                 390                 395                 400

Ala Val Asn Ile Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn
                405                 410                 415

Pro Glu Glu Trp Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile
            420                 425                 430
```

```
Asp Phe Gln Lys Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala
        435                 440                 445


Gly Ser Leu Gln Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met
    450                 455                 460


Val Gln Glu Phe Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val
465                 470                 475                 480


Asn Thr Ile Gly Leu Thr Asn Gln Met Leu Arg Pro Leu Arg Ala Ile
                485                 490                 495


Ile Lys Pro Arg Ile
            500


<210>  108
<211>  513
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic - Engineered valencene oxidase variant

<400>  108

Met Asp Ala Val Thr Gly Leu Leu Thr Val Pro Ala Thr Ala Ile Thr
1               5                   10                  15


Ile Gly Gly Thr Ala Val Ala Leu Ala Val Ala Leu Ile Phe Trp Tyr
            20                  25                  30


Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser Asn His Leu Pro
        35                  40                  45


Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly Asn Leu Leu Gln
    50                  55                  60


Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg Trp Ala Ala Thr
65                  70                  75                  80


Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr Ser Met Val Val
                85                  90                  95
```

```
Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val Thr Arg Phe Gln
            100                 105                 110

Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys Val Leu Thr Ala
        115                 120                 125

Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp Tyr His Lys Thr
    130                 135                 140

Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro Asn Ala Gln Lys
145                 150                 155                 160

Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn Ile Ser Thr Gln
                165                 170                 175

Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu Glu Val Asp Leu
            180                 185                 190

Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala Met Arg Gln Ala
        195                 200                 205

Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp Leu Lys Ile Thr
    210                 215                 220

Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val Asp Pro Met Met
225                 230                 235                 240

Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp
                245                 250                 255

Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln Met Tyr Ile Arg
            260                 265                 270

Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His Lys Lys Arg Ile
        275                 280                 285

Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr Leu Leu Ser Glu
    290                 295                 300
```

```
Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser Leu Trp Glu Pro
305                 310                 315                 320

Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met
                325                 330                 335

Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg Leu Tyr Arg Asp
            340                 345                 350

Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu Glu His Leu Ser
        355                 360                 365

Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr Leu Arg Arg His
    370                 375                 380

Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His Glu Asp Thr Val
385                 390                 395                 400

Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu Ala Val Asn Ile
                405                 410                 415

Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn Pro Glu Glu Trp
            420                 425                 430

Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile Asp Phe Gln Lys
        435                 440                 445

Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala Gly Ser Leu Gln
    450                 455                 460

Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met Val Gln Glu Phe
465                 470                 475                 480

Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val Asn Thr Ile Gly
                485                 490                 495

Leu Thr Thr Gln Met Leu Arg Pro Leu Arg Ala Ile Ile Lys Pro Arg
            500                 505                 510

Ile
```

<210> 109
<211> 513
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 109

```
Met Asp Ala Val Thr Gly Leu Leu Thr Val Pro Ala Thr Ala Ile Thr
1               5                  10                  15


Ile Gly Gly Thr Ala Val Ala Leu Ala Val Ala Leu Ile Phe Trp Tyr
            20                  25                  30


Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser Asn His Leu Pro
        35                  40                  45


Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly Asn Leu Leu Gln
    50                  55                  60


Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg Trp Ala Ala Thr
65                  70                  75                  80


Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr Ser Met Val Val
                85                  90                  95


Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val Thr Arg Phe Gln
            100                 105                 110


Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys Val Leu Thr Ala
        115                 120                 125


Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp Tyr His Lys Thr
    130                 135                 140


Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro Asn Ala Gln Lys
145                 150                 155                 160


Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn Ile Ser Thr Gln
                165                 170                 175
```

```
Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu Glu Val Asp Leu
            180                 185                 190

Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala Met Arg Gln Ala
        195                 200                 205

Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp Leu Lys Ile Thr
    210                 215                 220

Met Asn Arg Asp Glu Ile Phe Gln Val Leu Val Val Asp Pro Met Met
225                 230                 235                 240

Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp
                245                 250                 255

Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln Met Tyr Ile Arg
            260                 265                 270

Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu His Lys Lys Arg Ile
        275                 280                 285

Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr Leu Leu Ser Glu
    290                 295                 300

Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser Leu Trp Glu Pro
305                 310                 315                 320

Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met
                325                 330                 335

Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg Leu Tyr Arg Asp
            340                 345                 350

Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu Glu His Leu Ser
        355                 360                 365

Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr Leu Arg Arg His
    370                 375                 380
```

```
Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His Glu Asp Thr Val
385                 390                 395                 400

Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu Ala Val Asn Ile
                405                 410                 415

Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn Pro Glu Glu Trp
            420                 425                 430

Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile Asp Phe Gln Lys
        435                 440                 445

Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala Gly Ser Leu Gln
    450                 455                 460

Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met Val Gln Glu Phe
465                 470                 475                 480

Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val Asn Thr Ile Gly
                485                 490                 495

Leu Thr Asn Gln Met Leu Arg Pro Leu Arg Ala Ile Ile Lys Pro Arg
            500                 505                 510

Ile
```

<210> 110
<211> 513
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 110

```
Met Asp Ala Val Thr Gly Leu Leu Thr Val Pro Ala Thr Ala Ile Thr
1               5                   10                  15

Ile Gly Gly Thr Ala Val Ala Leu Ala Val Ala Leu Ile Phe Trp Tyr
            20                  25                  30
```

```
Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser Asn Arg Leu Pro
        35                  40                  45

Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly Asn Leu Leu Gln
    50                  55                  60

Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Arg Trp Ala Ala Thr
65                  70                  75                  80

Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr Ser Met Val Val
                85                  90                  95

Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val Thr Arg Phe Gln
            100                 105                 110

Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys Val Leu Thr Ala
        115                 120                 125

Asp Lys Thr Met Val Ala Met Ser Asp Tyr Asp Asp Tyr His Lys Thr
    130                 135                 140

Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro Asn Ala Gln Lys
145                 150                 155                 160

Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn Ile Ser Thr Gln
                165                 170                 175

Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu Glu Val Asp Leu
            180                 185                 190

Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala Met Arg Gln Ala
        195                 200                 205

Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp Leu Lys Ile Thr
    210                 215                 220

Met Asn Arg Asp Glu Ile Leu Gln Val Leu Val Val Asp Pro Met Met
225                 230                 235                 240

Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp
                245                 250                 255
```

```
Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln Met Tyr Ile Arg
            260                 265                 270

Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu Gln Lys Lys Arg Ile
        275                 280                 285

Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr Leu Leu Ser Glu
    290                 295                 300

Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser Leu Trp Glu Pro
305                 310                 315                 320

Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met
                325                 330                 335

Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg Leu Tyr Arg Asp
            340                 345                 350

Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu Glu His Leu Ser
        355                 360                 365

Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr Leu Arg Lys His
    370                 375                 380

Ser Pro Val Pro Ile Ile Pro Leu Arg His Val His Glu Asp Thr Gln
385                 390                 395                 400

Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu Ala Val Asn Ile
                405                 410                 415

Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn Pro Glu Glu Trp
            420                 425                 430

Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ala Asp Phe Gln Lys
        435                 440                 445

Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala Gly Ser Leu Gln
    450                 455                 460
```

```
Ala Leu Leu Thr Ala Ser Ile Gly Ile Gly Arg Met Val Gln Glu Phe
465                 470                 475                 480


Glu Trp Lys Leu Lys Asp Met Asp Gln Glu Glu Val Asn Thr Ile Gly
                485                 490                 495


Leu Thr Asn Gln Met Leu Arg Pro Leu Arg Ala Ile Ile Lys Pro Arg
            500                 505                 510


Ile
```

<210> 111
<211> 513
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene oxidase variant

<400> 111

```
Met Asp Ala Val Thr Gly Leu Leu Thr Val Pro Ala Thr Ala Ile Thr
1               5                   10                  15


Ile Gly Gly Thr Ala Val Ala Leu Ala Val Ala Leu Ile Phe Trp Tyr
            20                  25                  30


Leu Lys Ser Tyr Thr Ser Ala Arg Arg Ser Gln Ser Asn His Leu Pro
        35                  40                  45


Arg Val Pro Glu Val Pro Gly Val Pro Leu Leu Gly Asn Leu Leu Gln
    50                  55                  60


Leu Lys Glu Lys Lys Pro Tyr Met Thr Phe Thr Lys Trp Ala Ala Thr
65                  70                  75                  80


Tyr Gly Pro Ile Tyr Ser Ile Lys Thr Gly Ala Thr Ser Val Val Val
                85                  90                  95


Val Ser Ser Asn Glu Ile Ala Lys Glu Ala Leu Val Thr Arg Phe Gln
            100                 105                 110
```

```
Ser Ile Ser Thr Arg Asn Leu Ser Lys Ala Leu Lys Val Leu Thr Ala
        115                 120                 125

Asp Lys Gln Met Val Ala Met Ser Asp Tyr Asp Asp Tyr His Lys Thr
    130                 135                 140

Val Lys Arg His Ile Leu Thr Ala Val Leu Gly Pro Asn Ala Gln Lys
145                 150                 155                 160

Lys His Arg Ile His Arg Asp Ile Met Met Asp Asn Ile Ser Thr Gln
                165                 170                 175

Leu His Glu Phe Val Lys Asn Asn Pro Glu Gln Glu Glu Val Asp Leu
            180                 185                 190

Arg Lys Ile Phe Gln Ser Glu Leu Phe Gly Leu Ala Met Arg Gln Ala
        195                 200                 205

Leu Gly Lys Asp Val Glu Ser Leu Tyr Val Glu Asp Leu Lys Ile Thr
    210                 215                 220

Met Asn Arg Asp Glu Ile Leu Gln Val Leu Val Val Asp Pro Met Met
225                 230                 235                 240

Gly Ala Ile Asp Val Asp Trp Arg Asp Phe Phe Pro Tyr Leu Lys Trp
                245                 250                 255

Val Pro Asn Lys Lys Phe Glu Asn Thr Ile Gln Gln Met Tyr Ile Arg
            260                 265                 270

Arg Glu Ala Val Met Lys Ser Leu Ile Lys Glu Gln Lys Lys Arg Ile
        275                 280                 285

Ala Ser Gly Glu Lys Leu Asn Ser Tyr Ile Asp Tyr Leu Leu Ser Glu
    290                 295                 300

Ala Gln Thr Leu Thr Asp Gln Gln Leu Leu Met Ser Leu Trp Glu Pro
305                 310                 315                 320

Ile Ile Glu Ser Ser Asp Thr Thr Met Val Thr Thr Glu Trp Ala Met
                325                 330                 335
```

```
Tyr Glu Leu Ala Lys Asn Pro Lys Leu Gln Asp Arg Leu Tyr Arg Asp
            340                 345                 350

Ile Lys Ser Val Cys Gly Ser Glu Lys Ile Thr Glu Glu His Leu Ser
        355                 360                 365

Gln Leu Pro Tyr Ile Thr Ala Ile Phe His Glu Thr Leu Arg Lys His
    370                 375                 380

Ser Pro Val Pro Ile Leu Pro Leu Arg His Val His Glu Asp Thr Val
385                 390                 395                 400

Leu Gly Gly Tyr His Val Pro Ala Gly Thr Glu Leu Ala Val Asn Ile
                405                 410                 415

Tyr Gly Cys Asn Met Asp Lys Asn Val Trp Glu Asn Pro Glu Glu Trp
            420                 425                 430

Asn Pro Glu Arg Phe Met Lys Glu Asn Glu Thr Ile Asp Phe Gln Lys
        435                 440                 445

Thr Met Ala Phe Gly Gly Gly Lys Arg Val Cys Ala Gly Ser Leu Gln
    450                 455                 460

Ala Leu Leu Ile Ala Ser Ile Gly Ile Gly Arg Met Val Gln Glu Phe
465                 470                 475                 480

Glu Trp Lys Leu Lys Asp Met Thr Gln Glu Glu Val Asn Thr Ile Gly
                485                 490                 495

Leu Thr Asn Gln Met Leu Arg Pro Leu Arg Ala Ile Ile Lys Pro Arg
            500                 505                 510

Ile
```

<210> 112
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Leader sequence

<400> 112

Met Ala Leu Leu Leu Ala Val Phe
1   5

<210> 113
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Linker sequence

<400> 113

Gly Ser Gly Gly Gly Gly Ser
1   5

<210> 114
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Linker sequence

<400> 114

Gly Ser Gly Glu Ala Ala Ala Lys
1   5

<210> 115
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Linker sequence

<400> 115

Gly Ser Gly Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys
1   5   10

<210> 116
<211> 9

<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Linker sequence

<400> 116

Gly Ser Gly Met Gly Ser Ser Ser Asn
1   5

<210> 117
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic - Linker sequence

<400> 117

Gly Ser Thr Gly Ser
1   5

<210> 118
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic sequence

<400> 118

Met Ala Trp Glu Tyr Ala Leu Ile Gly Leu Val Val Gly Ile Ile Ile
1   5   10   15

Gly Ala Val Ala
            20