SEQUENCE LISTING

<110> Manus Biosynthesis, Inc.
Kumaran, Ajikumar Parayil
Lim, Chin Giaw
Li, Liwei
Ghosh, Souvik
Pirie, Christopher
Qualley, Anthony

<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

<210> 1
<211> 556
<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
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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Tyr Thr Ile Ser Cys Asp Ile Phe Asn Lys Phe Thr Asp Glu Arg Gly
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Arg Phe Lys Glu Ala Leu Ile Ser Asp Val Arg Gly Met Leu Gly Leu
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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 Thr Pro Glu
305                 310                 315                 320

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

Ile Asn Gln Leu Pro Glu Tyr Met Lys Leu Cys Tyr Val Ala Leu Leu
            340                 345                 350
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Asp Val Tyr Lys Glu Ile Glu Glu Glu Met Glu Lys Glu Gly Asn Gln
        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
385                 390                 395                 400

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
        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 Ala Val Ile
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<213> Vitis vinifera

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120

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180

aagctgaccg cagcagcagt ggcaaacccg tctcagctgc tgaattttat cgatgcggtt
240

caacgtctgg gcgtcgccta tcatttcgaa caggaaattg aagaagcact gcaacatatc
300

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420

gatgaacgtg gtcgctttaa ggaagcgctg atctcagacg ttcgtggcat gctgggtctg
480

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540

accacgaccc acctgaaggc gatggtcgaa tctctgggtt accatctggc agaacaggtg
600

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660

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720

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780

aaagaactgg actttgcgac caagctgccg ttcgcccgtg atcgcctggt tgaaggctat
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ttttggatgc atggtgtcta tttcgaaccg cagtacctgc gcggtcgtcg cattctgacg
900

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1020

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1080

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1140

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1200

gaagaatata tgcgcgttgc gctggccagc tctggctact gtctgctggc cacgacctct
1260

tttgtgggca tgggtgaaat tgcaacgaaa gaagcgtttg actgggttac cagtgatccg
1320

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1440

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attaatcagg aatgtctgaa accgacggca gtctccatgc cgctgctggc tcgtctgctg
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aattttacgc gcacgatgga tgtgatctat aaagaacagg attcgtacac ccatgtgggc
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1671

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<213> Artificial Sequence

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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 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

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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 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
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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 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
        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 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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<212> DNA
<213> Artificial Sequence

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<223> Synthetic - Engineered valencene synthase

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120

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

tacgaagccg cacatctgcg cgtgcacggc gaagacattc tggcgaaggc gctggcattc
540

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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

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900

aaggtgatcg ccatgaccag cattctggac gacatccacg atgcgtacgg gagccctgag
960

gagttaaagc tgttcatcga ggcaatcgag aagtgggatg agagtagcat caaccaactg
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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

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1320

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1380

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1500

atcaaccaag agtgcctgaa accgaccgca gtgccgatgc ctctgttagc ccgtctgctg
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aatttcacac gcacgatgga cgttatctac aaggagcagg atagctacac ccacgttggt
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<212> PRT
<213> Artificial Sequence

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

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
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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
545 550 555

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<212> DNA
<213> Artificial Sequence

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<223> Synthetic - Engineered valencene synthase

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240

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300

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360

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420

gacgagcgcg gtcgttttaa agaggcgctg attagcgacg ttcgcggcat gttaggtctg
480

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540

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660

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960

gagttaaagc tgttcatcga ggcaatcgag aagtgggatg agagtagcat caaccaactg
1020

ccggagtata tgaaactgtg ctatgtggcc ctgctggatg tttacaatga gattgaagag
1080

gagatggaga aagaggggaa ccagtaccgc atccactacc tgaaagaggt gatgaagaat
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1200

gaggagtaca tgcgcgtggc attagccagc agtggttact gtctgttagc cgttacgagc
1260

ttcgtgggta tgggcgagat cgtgaccaaa gaggcattcg actgggtgac gagcgacccg
1320

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1380

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1440

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1500

atcaaccaag agtgcctgaa accgaccgca gtgccgatgc ctctgttagc ccgtctgctg
1560

aatttcacac gcacgatgga cgttatctac aaggagcagg atagctacac ccacgttggt
1620

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1671

<210> 7
<211> 556
<212> PRT
<213> Artificial Sequence

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<223> Synthetic - Engineered valencene synthase

<400> 7

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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
        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
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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

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

Asp Asn Ile Ala Ser Val Phe Ile Asn Pro Val Ile
545                 550                 555
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<210> 8
<211> 1671
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene synthase

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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
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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 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
545                 550                 555
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<210> 10
<211> 1671
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic - Engineered valencene synthase

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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
545                 550                 555
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<210> 12
<211> 548
<212> PRT
<213> Citrus sinensus

<400> 12

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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
```

<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
```

<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
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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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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

tcatttaaac cggaacgctt tgaaggcatc tctgtggatt tcaaaggtag taattttgaa
1320

tttatgccgt tcggcgcggg ccgtcgtatt tgtccgggca tgacctttgg tatctcctca
1380

gttgaagtcg cgctggccca tctgctgttt cacttcgatt ggcaactgcc gcaaggcatg
1440

aaaattgaag atctggacat gatggaagtc tcgggtatga gcgcaacccg tcgtagcccg
1500

ctgctggttc tggccaaact gattatcccg ctgccg
1536

<210> 16
<211> 496
<212> PRT
<213> Barnadesia spinosa

<400> 16

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

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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
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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
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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

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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
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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

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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

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

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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
atggctctgt tattagcagt ttttgccgtc gctctggcgg tagcactgat cttctggtat
60

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

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1380

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1503

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<212> PRT
<213> Physcomitrella patens

<400> 40

Met Ala Lys His Leu Ala Thr Gln Leu Leu Gln Gln Trp Asn Glu Ala
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Leu Lys Thr Met Pro Pro Gly Phe Arg Thr Ala Gly Lys Ile Leu Val
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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

Lys Leu Ser Pro Leu Ser Cys Glu Ala Thr Pro Arg Ile Ser His Arg
    530                 535                 540

Leu Pro
545
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<210> 41
<211> 548

<212> PRT
<213> Physcomitrella patens

<400> 41

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Met Ala Leu Leu Leu Ala Val Phe Thr Gln Leu Leu Gln Gln Trp Asn
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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
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<210> 42
<211> 1644
<212> DNA
<213> Physcomitrella patens

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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
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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

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gcaaataaaa aggtggatat gggctttcgt gacttcagcc tgatgccgtt tggcgccggt
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1644

<210> 43
<211> 1049
<212> PRT
<213> Bacillus megaterium

<400> 43

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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

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
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
```

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            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

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
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```
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
            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
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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

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<211> 3150
<212> DNA
<213> Bacillus megaterium

<400> 44
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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

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420

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480

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720

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1200

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1380

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1500

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1800

cgtggtgaag cagacgcttc cgatgacttt gaaggcacct atgaagaatg gcgcgaacac
1860

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1920

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1980

ggcgctttct ccacgaatgt cgtggcttca aaagaactgc agcaaccggg ttcggcacgt
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2280

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2880

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<210> 45
<211> 396
<212> PRT
<213> Pleurotus sapidus

<400> 45

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Gly Lys Leu His Pro Leu Ala Ile Ile Pro Asp Tyr Lys Gly Ser Met
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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
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

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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atgcgttatg gctgtgctgc tgtggctctg ttctatctga ccgctatggg caaactgcac
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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
            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
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
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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
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

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

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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

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

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

```
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
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<210> 62
<211> 710
<212> PRT
<213> Stevia rebaudiana

<400> 62

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Met Gln Ser Asp Ser Val Lys Val Ser Pro Phe Asp Leu Val Ser Ala
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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
            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
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Ser Ser Lys Ala Glu Leu Tyr Val Lys Asn Leu Gln Met Ser Gly Arg
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Tyr Leu Arg Asp Val Trp
705 710

<210> 63
<211> 2133
<212> DNA
<213> Stevia rebaudiana

<400> 63
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aaagcaatgg agaaactgaa cgcgagcgaa tctgaagatc caaccaccct gccggcactg
120

aaaatgctgg tagaaaaccg tgaactgctg actctgttca ccacctcctt cgccgttctg
180

attggttgcc tggtcttcct gatgtggcgc cgttcctctt ccaagaagct ggtacaggac
240

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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600

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660

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

ctgcacacga gccagtccga ccgctcttgt acgcacctgg agttcgatat ctcccacacc
1020

ggtctgtcct atgaaaccgg tgaccatgtt ggcgtttaca gcgaaaacct gagcgaggta
1080

gttgatgaag cgctgaaact gctgggcctg tctccagaca cctactttag cgtgcatgct
1140

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1200

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1260

ctgctggcgc tggccgcaca tgcttctgac ccgtctgaag ctgaccgtct gaaattcctg
1320

gcgtctccgg ccggcaaaga cgaatacgcg cagtggattg tcgctaacca gcgctctctg
1380

ctggaagtga tgcagtcctt cccgtctgcc aaaccgccac tgggcgtgtt tttcgcagct
1440

gtggctccgc gcctgcagcc gcgctactat tctatctcta gctccccgaa aatgagcccg
1500

aaccgcatcc acgttacttg tgctctggtt tacgaaacca cccctgcggg ccgtatccac
1560

cgtggtctgt gctctacgtg gatgaaaaat gccgtgccgc tgaccgaatc cccggactgc
1620

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cgtctggctc tgaaagaatc cggtactgag ctgggctctt ccatcttttt cttcggttgt
1800

cgtaaccgca aagtcgattt catctatgaa gacgaactga acaacttcgt agagactggt
1860

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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2100

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2133

<210> 64
<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

```
                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
```

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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
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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
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<211> 2079
<212> DNA
<213> Arabidopsis thaliana

<400> 65
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120

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

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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

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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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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
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    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
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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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<212> DNA
<213> Taxus cuspidata

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120

atgaccggct cggctttgat tttgacagag aattcgcaga atttgatgat tttgaccacg
180

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240

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300

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

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660

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720

gatgatgacc aatgcattga agatgacttt actgcttggc gagagcaggt ttggcctgaa
780

ctggatcagt tactccggga tgaagatgat gagcccacaa gtgctacacc ttatacagct
840

gccatacctg agtatagggt tgaaatttat gattccgtgg tttcagtgta cgaggaaact
900

catgctctca agcaaaatgg ccaagctgtt tatgatatcc atcacccctg cagatctaat
960

gtggcagtga gaagagagct tcatacacct ttgtctgacc gctcttgcat ccatttggaa
1020

tttgatatat cagacactgg ccttatatat gagacaggag atcatgttgg tgtccataca
1080

gaaaacagca ttgaaactgt ggaggaagca gcaaagctac taggctacca attggacact
1140

atattctcag tccacggtga caaagaagat ggcacgccac ttggagggtc ttctttgcca
1200

ccacctttcc ctggtccatg caccctacga actgctcttg ctcgttatgc tgatttgctg
1260

aatcctcctc ggaaggccgc ctttcttgca ttggcagctc atgcatctga tccagcagag
1320

gcagagcggt tgaagttcct ctcatcacca gctggaaagg atgaatattc tcaatgggtc
1380

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1440

cttggtgttt tctttgcagc aatagcccct cgtctgcaac cccgatatta ttctatttct
1500

tcctctccca ggtttgcacc ctcaagaata catgtgacat gtgctcttgt ttacgggccc
1560

agtccaaccg gtagaattca caaaggtgtt tgttctaact ggatgaagaa ttcgctaccc
1620

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1680

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1800

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

cacaggacac tgcacactat tgtccaagag caggaatctg tggatagcag caaagcagag
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2154

<210> 68
<211> 705
<212> PRT
<213> Artemisia annua

<400> 68

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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

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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

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
```

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                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
        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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120

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 gttcttttt
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

accccgctgg gtggcgcatc gttaccccca ccctttccac catgcactct gcgtaaggcg
1200

cttgccagtt atgctgatgt tttgtctagt cccaaaaaga gtgcacttct cgcactggcg
1260

gcccatgcca ctgatagtac agaggccgac aggctgaaat ttctggcgtc accagcggga
1320

aaagacgaat acgcccaatg gatcgttgcc agtcatcggt ctttactgga agtgatggaa
1380

gcgttccctt ccgctaagcc acctctgggg gtctttttcg ctagtgtggc accccgtcta
1440

cagccccggt attactcaat atctagctca cccagatttg ctccgaatag aatacacgta
1500

acatgcgcgc tggtctatga gcagacccca agtggacggg tgcataaagg ggtttgttct
1560

acctggatga agaacgccgt cccaatgacc gagtctcagg attgttcctg ggcacctata
1620

tatgttagaa catcaaactt tcgactgcca agtgacccga aagttccggt aattatgata
1680

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1800

gattttatat atgaagatga gttgaacaat ttcgtggaaa ccggggcatt atcggaatta
1860

gttacggctt ttagcaggga gggggcgact aaagagtatg tccagcacaa gatgactcag
1920

aaagcctcag atatatggaa cctgctgtcg gagggagcct atctttatgt ttgcggtgat
1980

gcaaaaggaa tggccaaaga tgtccaccgg accctccaca ctattgtgca ggaacagggt
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2100

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2118

<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
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

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
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        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
    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
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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

Ser Glu Ala Glu Ala Ile Val Lys Lys Leu Gln Thr Glu Gly Arg Tyr
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Leu Arg Asp Val Trp
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<211> 2082
<212> DNA
<213> Arabidopsis thaliana

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120

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

gtcgaaatag tagaagaagc tggcaaactg ctgggacatt cactcgatct agtgtttagt
1080

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1140

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1200

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cgctctctgc tggaagtgat ggccgcattt ccgtccgcca aaccaccttt gggagtattt
1380

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1440

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1560

catgagtgca gtggtgcacc tatttttatc cgcgcaagta acttcaaact cccttctaat
1620

ccgagcacgc ccattgtgat ggttggccca ggcactggcc ttgctccgtt tcgcggtttt
1680

ctacaggagc ggatggccct taaagaagat ggggaagaat tgggatcatc gttgctcttt
1740

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1800

gatcaaggag taatttcgga gttgattatg gcattttcac gcgaaggggc tcagaaagag
1860

tatgtccaac acaagatgat ggaaaaagcg gcacaagtgt gggatcttat taaagaagaa
1920

ggctatcttt atgtatgtgg ggatgcgaaa ggtatggccc gtgatgtcca tcgcaccctg
1980

cacacgattg tacaggaaca ggaaggtgtg tcctcgtccg aagcagaagc aatcgttaaa
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aaactgcaaa cagagggtcg ttaccttcgc gacgtgtggt aa
2082

<210> 72
<211> 712
<212> PRT
<213> Arabidopsis thaliana

<400> 72

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Ala Ala Ile Ile Lys Gly Glu Pro Val Ile Val Ser Asp Pro Ala Asn

```
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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
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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 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
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                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
705                 710
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<211> 2139
<212> DNA
<213> Arabidopsis thaliana

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120

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

ttttacaagt ggttcaccga aggaaatgat cggggagaat ggttaaaaaa tctgaaatac
600

ggtgtgttcg gtcttggcaa tcgccaatat gagcatttta ataaagtcgc gaaagtggtc
660

gatgatatat tggtagaaca gggcgctcag cgcctcgtcc aggtggggct tggcgacgat
720

gatcagtgca tagaagatga ttttactgca tggcgtgaag cgctgtggcc ggagctggac
780

accattttac gtgaagaggg cgatacagca gtggcaaccc cgtacacggc tgccgtctta
840

gagtatcgtg tgtccattca tgatagcgag gatgccaaat tcaatgacat caatatggcg
900

aatggaaatg ggtacaccgt gtttgacgcg cagcacccgt ataaggcaaa cgttgcagtc
960

aagagggaac tgcatactcc tgaaagtgat cgcagttgca tccacctgga gttcgatatt
1020

gcgggatcag gtttaacgta cgaaacgggc gaccacgtag gtgtgctgtg cgacaatctt
1080

tcagagacag tggacgaagc tctgcgcctg ctggatatga gcccggatac ctattttagc
1140

ttgcacgctg agaaagaaga tgggactcca attagcagta gcttacctcc acccttttccg
1200

ccgtgtaatt tgcgtaccgc ccttacgcgc tatgcgtgtc tgctgagttc gccaaagaag
1260

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Glu Asn Arg Gln Phe Ala Met Ile Val Thr Thr Ser Ile Ala Val Leu
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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

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Gln Tyr Glu His Phe Asn Lys Val Ala Lys Val Val Asp Asp Ile Leu
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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
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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
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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
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Asp Glu Tyr Ser Lys Trp Val Val Glu Ser Gln Arg Ser Leu Leu Glu
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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
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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
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Ile Ser Gln Gly Ala Tyr Leu Tyr Val Cys Gly Asp Ala Lys Gly Met
            660                 665                 670
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Ala Arg Asp Val His Arg Ser Leu His Thr Ile Ala Gln Glu Gln Gly
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Ser Gly Arg Tyr Leu Arg Asp Val Trp
705 710

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120

gctgaactgt cctcgatgct gatcgaaaat cgccaatttg caatgattgt tacaaccagc
180

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240

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300

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360

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420

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600

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720

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960

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<400> 76

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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

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

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Ala Phe Phe Phe Leu Ala Thr Tyr Gly Asp Gly Glu Pro Thr Asp Asn
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Ala Ala Asn Phe Tyr Lys Trp Phe Thr Glu Gly Asp Asp Lys Gly Glu
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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
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
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Leu Gly Leu Ser Pro Asp Thr Tyr Phe Ser Val His Ala Asp Lys Glu
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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

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
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Glu Leu Ile Val Ala Phe Ser Arg Glu Gly Thr Ala Lys Glu Tyr Val
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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

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Arg Tyr Leu Arg Asp Val Trp
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<211> 2136
<212> DNA
<213> Stevia rebaudiana

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<400> 78

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

gtggccccgc ggctccagcc gcgttattat tcaattagca gttctcctaa gatggaacct
1500

aatcgaatcc atgtaacatg tgcattggtc tatgagaaaa cgccggctgg ccgcatccat
1560

aaaggtatat gtagcacatg gatgaaaaat gcagtacccc tcacggagtc ccaggattgt
1620

agttgggcgc cgatatttgt tcggacgagc aattttagac ttcctataga cccaaaggtt
1680

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

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
```

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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
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<210> 81
<211> 2127
<212> DNA
<213> Stevia rebaudiana

<400> 81
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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
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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
        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
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Val Trp
705

<210> 83
<211> 2121
<212> DNA
<213> Pelargonium graveolens

<400> 83
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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
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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
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<210> 85
<211> 834
<212> DNA
<213> Rhodococcus erythropolis

<400> 85
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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
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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
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<210> 87
<211> 843
<212> DNA
<213> Citrus sinensus

<400> 87
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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
atgtcaaaac cgcgtctgca aggcaaagtg gctattatta tgggtgctgc gtctggcatc
60

ggtgaagcta cggctaaact gttcgctgaa catggcgcat ttgtgattat cgctgatatt
120

caggacgaac tgggcaacca ggtggttagc tctatcggcc cggaaaaagc gtcttatcgt
180

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 catttttgaa
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
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<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 tacctttttc 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
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
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<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>
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<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