

pctau2013000426-seq1  
SEQUENCE LISTING

<110> Commonwealth Scientific and Industrial Research  
Organisation  
Grains Research and Development Corporation

<120> High oleic acid oils

<130> 513426

<150> US 61/638,447

<151> 2012-04-25

<150> AU 2012903992

<151> 2012-09-11

<160> 171

<170> PatentIn version 3.5

<210> 1

<211> 1214

<212> DNA

<213> Carthamus tinctorius

<400> 1

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| tatccgttcc ttctcttaca ttgtctatga ccttgctata gccttcgtct tctactacct | 240 |
| tgccaccacc tacatccacc gtctcccaac ccctttctcc tatctggcat ggctggctta | 300 |
| ctggatagtc caaggctgcg tgctcaccgg agcttgggtc gtagccacg aatgcggcca  | 360 |
| ccatgccttt agcgattatc aatgggttga cgacaccgtg ggcttcatag tccactcctt | 420 |
| tttactcgtc ccctacttct cgtggaaata cagtcacgg cgccaccact cgaacactgc  | 480 |
| atcgctcgag cgcgatgaag tctttgtccc aaagcccaga tcaaaactcc cttggtactc | 540 |
| gaaatacttg aacaacccgc ctggccgcat catcagcctg ttcgccactc tcaactctcg | 600 |
| ctggcccttg tacttgtctt tcaacgtctc tggaagacct tatgaccgct tcgcctgcca | 660 |
| ctacgctcct aacagccga tatacaacca ccgtgaacgc ctccagattt ggctctctga  | 720 |
| tgtgggaatc gtggccatgg cattcgtcct ttaccgtgtt gcactggtga aaggcgtgag | 780 |

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|                                                                    |      |
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| ctgggtggtc tgtgtgtatg ggataaccgtt gttgatcgtg aacgggttcc tgggtttgat | 840  |
| cacgttcctt cagcatacgc acccttcgtt gcctcactac gacgggtcgg aatgggactg  | 900  |
| gctgagaggg gcgttggcga cgggtggaccg agactacggt gtgctgaaca aggtgttcca | 960  |
| taacatcacg gacacgcacg tgggtgcacca tctgttctcg acaatgccgc attatcatgc | 1020 |
| gatggaggca acgagggcgg tgaaggggtt gctgggggag tattatcagt ttgacgagac  | 1080 |
| cccgttttac gcagcgatgt ggagagaggc aaaggagtgt ctgtttgtgg aggcagatga  | 1140 |
| agggaaagga ggtgtgtttt ggtacaagaa taagtaaagt tgtgatgtgg tgtgcttagg  | 1200 |
| aggtttatgg aatc                                                    | 1214 |

<210> 2

<211> 1456

<212> DNA

<213> Carthamus tinctorius

<400> 2

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| aaaagaaaac cgaactcgaa ggcatccaac gagtcccata ccaaaaacct ccgttcacag   | 180 |
| tcgggggatgt caaaaaagcc atcccacctc attgtttcaa tcgatcggtc atccgctctt  | 240 |
| tctcgtacgt cgtttacgac cttaccatcg catccatctt gtactacatc gccacaactt   | 300 |
| tcatcccgct cctcccgcac ccgctcgcct acgtggcctg gccattttac tgggccgttc   | 360 |
| agggtgtgt catgaccggg gtctgggtca tagcccacga atgcggccat cagccttta     | 420 |
| gcgactacca atggctcgac gacactgtcg gccttatcct acattctgtt cttcttgttc   | 480 |
| cttacttctc gtggaaatac agccaccgcc gccaccactc caacaccggc tcgattgagc   | 540 |
| acgacgaggt cttcgtcccg aaactcaa at ccgggggtccg gtccaccgca aaatacctaa | 600 |
| acaaccccc cggccggatc ttgacccttc ttgtcaccct caccctcggc tggccgttgt    | 660 |
| acctcatgtt caacgtctcc ggccgctact acgaccgctt tgcctgccat tttgacccaa   | 720 |
| acagccccat ctactcgaac cgtgaacgtg cccagatctt catctccgac gccgggatct   | 780 |
| tcgccgtcct ctacgggctc taccggctcg cggcgggtcaa agggctcgtg tgggtcctga  | 840 |
| ccgtctatgc cggaccgttg ctcgtgggtc acgggtttct tgtcctgatc acgttcctcc   | 900 |

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|                                                                   |      |
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| ccctggccac catcgaccgt gactacggga ttttaacaa ggtgttcac aacatcaccg   | 1020 |
| acaccacgt gaccaccat ctgttttcga cgatgccgca ttatcacgcg atggaggcca   | 1080 |
| cgaaggcgat aattccgatc ctcggggatt attatcagtt cgatgggacg tcagttttta | 1140 |
| aggcgatgta tagggagacg aaggagtgc tttatgtgga taaagatgag gaggtgaagg  | 1200 |
| atggggttta ctgggtaccg aataagattt gaagatgatg gatgaaatga aaaaatggta | 1260 |
| ttaatagagt ggcgaaatgg tgtctttaat tagtggtgtt ttagagtatg gttttatgag | 1320 |
| ttatgatatg ccatttaaat ggacatggaa ttgttagtga tttgaataac tttgtactc  | 1380 |
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| ctatgttga acctta                                                  | 1456 |

<210> 3  
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 <213> Carthamus tinctorius

|                                                                              |     |
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| ctccaagcct ccattcgagc ttagcgatct caagaaagca gtcccaccac actgtttcaa            | 180 |
| acgatctctt gtacgctcct ttgcagccct tttccgtgat atcataattg tcaccgcctt            | 240 |
| atactacctg gccgcaacca tcattccggt gtcctctaaa ccccttacat acgtagcgtg            | 300 |
| gccgctttat tggttcttcc aaggagccta tcttatgggt ttgtgggtca ttggccacga            | 360 |
| gtgcggccat catggcttca gcgagtacca atggctcgat gacaccgttg gtttcatcgt            | 420 |
| ccactcctt attctcactc cgtacttttg gttcaatac agccaccgaa cccaccacgc              | 480 |
| caacaccaac tccatcgaat acgatgaggt ttggatccct aaacgcaagt ctgataaatt            | 540 |
| gtactcggaa gttctcaaca acccactcgg atcctttatt gtatttgtgt tcaagatcgt            | 600 |
| tcttggttt cccttgact tcgtattcaa tctttacgga aggaagtacg agaagggaat              | 660 |
| cacaagccac ttttaccgt atagtcccat ctttaacgat agcgagcgct tccagatctt             | 720 |

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|                                                                    |      |
|--------------------------------------------------------------------|------|
| tctcaccgat cttggagtct ttggcacttt gtacgggtgtc taccgtcttg cgttgataaa | 780  |
| gggcacggaa tgggtgatca acttctacgg aatgccgatac cttttcatga gtgggttttt | 840  |
| catcttggtg acatatcttc accacaccca cccttccatc cctcactacg attccacgga  | 900  |
| atgggactgg cttagaggtg ctttggccac ggtggaccga aactttgggt tcttgaacca  | 960  |
| tgctttccat gacgtaactc gaactcacgc cgtacaccat ctgttcccaa ccatcccaca  | 1020 |
| ttaccatact ttcgaggcaa ggcaggccgt gatgccgatac ttgggcgatt actacaaata | 1080 |
| cgacgatacc ccgattctac aggccatatg gagagaaaca aaagattgca tctttatcga  | 1140 |
| acctgaagag gttaatggag agaaaaaggg tatctactgg ttttaciaat agatggaggt  | 1200 |
| tgcttaatta tatatgtatg ttgtgttgaa ttttcctcct atataataag ggctatatat  | 1260 |
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<210> 4

<211> 1346

<212> DNA

<213> Carthamus tinctorius

<400> 4

|                                                                   |     |
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| cctccattcg agcttagcga tctcaagaaa gcagttccac cacactgttt caagcgatct | 180 |
| cttggtgcgt cttttgcagc ctttttccgt gatatcataa tcgtctccgc cttatactat | 240 |
| ctggccgcaa ccgtcattcc ggtgctccct aaaccctta cgtacgtagc atggccgctt  | 300 |
| tattggttct tccaaggagc ttatcttatg ggtttgtggg tcattggcca cgaatgcggc | 360 |
| catcatggct tcagcgagta ccaatggctc gatgacaccg ttggtttcat cgtccactcc | 420 |
| ttgattctca ctccgtactt tgggttcaaa tacagccacc gaaccacca cgccaacacc  | 480 |
| aactccatcg aatacgaatg gggttgatc cctaaacgca agtctgataa attgtactcg  | 540 |
| gaaatcctca acaaccact cggatccttt gttgtatttg tgttcaagat cgttcttggg  | 600 |
| tttcccttgt acttcgtgtt caatctttat ggaaggaagt acgagaaggg aatcacgagc | 660 |
| cacttttacc catacagtc cactttcaac gatagcgagc gtttccagat ctttctcacc  | 720 |
| gatctcggag tctttggcac tttgtatggt gtctaccgtc ttgcgttgat aaagggcacg | 780 |

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|                                                                    |      |
|--------------------------------------------------------------------|------|
| gaatgggtga tcaacttcta cggaatgccg atccttttca tgagtgggtt tttcatcttg  | 840  |
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| tggcttagag gtgctttggc cacggtggac cgaaactttg ggcttcttgaa ccatgccttc | 960  |
| catgacgtaa ctcgaactca cgcggtacac catctgttcc caaccatccc acattaccat  | 1020 |
| actttcgagg caaggcaggc cgtgatgccg atcttgggtg attactacaa atacgatgat  | 1080 |
| accccgattc tagaggccgt ttggagagag acgaaagact gcatctttat cgaacctgaa  | 1140 |
| gaggttaacg gggagaaaaa gggatatttac tggttctata agtagagaaa tcataattat | 1200 |
| atatgtacca tactgaaaga attggattaa gtacatccag cggattgatc aaatacttgt  | 1260 |
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<210> 5  
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 <213> Carthamus tinctorius

|                                                                    |     |
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| atgttcccgt cgagaagcct tcattcggga ttgctgatct caagaaggcc ataccaccac  | 180 |
| actgtttcaa gcggtcccta accacctctt tctactacct tttccgtgat ttgggtctca  | 240 |
| tctacgcttt ctactatatt gcaacaaaat acattacca tctccccaa ccctactcgt    | 300 |
| ttgtggcatg gccactttat tggatcgccc aaggtgccat ttgcatgggt ttatggaata  | 360 |
| tcgtccatga ttgtgggtcat cactgcttta gcgattatca atggcttgat gacaccattg | 420 |
| gcttcatctg ccactccttt ctgctcactc catacttctc tttcaaatac agtcaccgta  | 480 |
| ctcatcatgc taacaccagt tcactcgaag gggatgaagt atgggtccca aaacgcaagc  | 540 |
| acgatacttg gttttatgag gttctcagca acccagtggg aagctttatc atgcttgtgt  | 600 |
| ttaggttatt ttttggcttt cccttgact ttatgttcaa tcttcatggg aggatataca   | 660 |
| agggtttccc tagccacttc aaccggttag gccccatctt caacgaccga gagcgtgcta  | 720 |

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|                                                                    |      |
|--------------------------------------------------------------------|------|
| atatctggct ctctgatgcc ggagttctta ccgttgtcta tgcgctctac cgtattgggg  | 780  |
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| cctttttcat catgttcaca tatctacacc acactcatcc ttccatcgct cactacgatt  | 900  |
| cgtcggaatg ggattgggtg agaggtgctt tgtcaaccgt ggatagggat tatgggatct  | 960  |
| tgaacaacat cttccatgac gtaacaagtg ctcatgtggt gcaccatcta ttctcgagca  | 1020 |
| ttccgcatta caatacggta gaggccacac agtacatcaa gccaatcttg ggcgactact  | 1080 |
| acaactacga ttatactccc attctcaagg caatctggag agacacaaaa gaatgtctct  | 1140 |
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<210> 6

<211> 1148

<212> DNA

<213> Carthamus tinctorius

<400> 6

|                                                                   |     |
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| caataccgcc acattgcttc aagcgatctc ttaccacctc tttctactac cttttccgtg | 180 |
| atatttgcat atgctatacc tgggtaccacc tcggatcaaa ttacctcccc ctctcccta | 240 |
| aaccccttgc ctacatagca tggccacttt attggttctg ccaaggtagt agtttcatgg | 300 |
| gtatatggag cataggtcac gatttgggcc atcatgcctt tagcgagtac cagtggcttg | 360 |
| atgatgcact tggtttcgta atccactccg ctttcctcac tccatacttt tctttcaaat | 420 |
| acagtcaccg tagccacat gctcacacca actcaatgga atacgatgag gtatggatcc  | 480 |
| ctaaaagaaa ggccgatacc atgtattctg aagtcctcaa caaccactc ggaaacttgt  | 540 |
| tcatgactgt cgtaggttg cttttcagct ttcccatgta ctttaccttc aacattcatg  | 600 |
| gaaggccgta taacgggttt gtaagccact tctaccaca aagtcctatg ttcaatgaca  | 660 |
| gtgagcgcaa actagtgtgg ctctctgatg ccggaatggt tgcagctttc tatgggcttt | 720 |
| acaagattgc ggcaagcacg agtgcaacat ggttgttttg catctacgga gtcctttgt  | 780 |
| tggttatgaa tgctcatttc atctttttca ctttcctaca ccatagccat gtttccttg  | 840 |

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|                                                                    |      |
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| actacggaat cctaaacact gttttccatg atgtgacctg tgctcacgtg gtgcatcatc  | 960  |
| tgatctcaac cattccgcat taccatacag tagaggccac caatgcagtc aagcccatct  | 1020 |
| taggtgacta ctacaaatac gatgatacac ccatacctaaa ggctttcttg agagaaacaa | 1080 |
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<210> 7

<211> 1210

<212> DNA

<213> Carthamus tinctorius

<400> 7

|                                                                    |     |
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| ccccattcgg ggatctccga tctcaagaaa gccataccac cgcactgttt caaacgatct  | 180 |
| cttatatggg cgtttggctc cttctttcga gatcttatcg taatctacag cttctactat  | 240 |
| ctcgcacga ctttcattcc tttgctccct ccgcccctct cgtacgtagc gtggccgcta   | 300 |
| tactggttcg cccagggcag cattctaatac ggggttttga tccttggtca tgaatgtggt | 360 |
| catcatgcct ttagcgagta ccaatgggtg gacgatgccg ttggcttctt catccattcg  | 420 |
| gtttgcctca ccccgactt ttccttcaag tacagccacc gtagccacca cgcccacacg   | 480 |
| aactccatcg agtacgacga ggtctacatc ccgaaacgca aggccgacac cttctactcc  | 540 |
| gagttcctaa acaacggacc cggaaacgtc ttcaccctcc tcctacggac gacgctcggc  | 600 |
| ttacccttgt acctgatctt caacacctac ggccgagact acaacggatt cgcaaaccat  | 660 |
| ttcctaccgc aatcgggcat tttcaacgac agcgagcgcg cccaggtcgt gctctcggac  | 720 |
| gtcgggatct tcgcggtcct ctacgcgctc taccggctcg tcctcatcca aggcctgaaa  | 780 |
| tcgacgatct tcctccaggg gattccgttg ttcgtgatga gcggcttctt catcttcttg  | 840 |
| acttacctaa accacacca tccggcgatc gctcactacg actccaccga atgggactgg   | 900 |
| ctaagaggcg ccctatcgac catcgatagg gatttcggaa tcttgaaccg ggttttccac  | 960 |

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|                                                                   |      |
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| atcgaggccc gggaggccgt gaagcccatc ttaggcgact actacatgta cgacgatacc | 1080 |
| ccgatactaa aggccatgtg gagagacaca aaggagtgc tctacgtcga accggacgac  | 1140 |
| gagaagaaag gtgtttactg gtatttcaag tagtttatat tatgtaacac catggaaatt | 1200 |
| ctttagatct                                                        | 1210 |

<210> 8

<211> 1269

<212> DNA

<213> Carthamus tinctorius

<400> 8

|                                                                    |      |
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| ggcccatcc tcgaagcccc cattcacctc tggcgacata aagaaagcca taccaccaca   | 180  |
| ctgcttcgag cgatccctca tccgatcttc ctctacctt ttcttggacc tctttctatc   | 240  |
| atccctcttt tactacgtgg cggccgtcta catccccgc cttccgatct ctctttcgta   | 300  |
| cgtggcatgg cccgtttatt ggatcctcca agggagcgtc cagatgggtt tgtgggtcat  | 360  |
| tggccacgag tgcggccacc aagccttcag tgactaccg tggtttaatg acaccattgg   | 420  |
| ttaccttcta cacaccggtg tgcttgcccc ttatttctct tggaaataca gccaccgtcg  | 480  |
| ccaccattcc aacacgggct cactcgagct cgacgaatct ttcgtcccca aaaagaagtc  | 540  |
| cagcctaaac tccgtagcca ggctgctcaa caccacccc ggccgtctct ttaggcttac   | 600  |
| gatcttatgc accgtaggct ggctcttgta catttgcttc aatgtttccg gccgcaagta  | 660  |
| tgagaagttc gcccaaccact ttgacccaaa gagtctatc tacaacgacc gcgagcgctt  | 720  |
| tcaaatctc ctgaccgaca tcgggcttct agtaacaagc tacgggctct acaaactggc   | 780  |
| cttagcccaa ggattcgctt ggctcataac catctacttt gtccttttg ttattgttta   | 840  |
| cgggttcctg gtggtgatca cttggttgca ccacaccac cggtcgctgc cacactacga   | 900  |
| ctccaccgag tggaactggg tgagggggagc tttgtcgacg atggatcgag attacggcgt | 960  |
| tttcaacacc gttctacatc acatcaccga cagcacgtt gcgcaccatt tgttcttcac   | 1020 |
| cattcctcat tataatgcc tggaggccac gaaagcaatc aaacctttct taggagaata   | 1080 |

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|                                                                    |      |
|--------------------------------------------------------------------|------|
| ctatcagttc gacgacaccc cgataatcaa agcgatgtgg agagaagcta ccgagtgcctt | 1140 |
| ctttgttgaa gctgatgaag gggaaggcaa gagcaaaggt gtctattgggt tcaacaataa | 1200 |
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| atagaaatc                                                          | 1269 |

<210> 9  
 <211> 1296  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                   |      |
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| gatcgaatcc tcgcatcta gacgttaaga aattcgatac cgtagaaggt atcaagagag  | 180  |
| ccccaacttc aaaacctcca ttcacattag cagatatcaa gaaagccata ccacccatt  | 240  |
| gcttccaaag atccctaatt cgatcctttt cgtatctcgt atacgacctc accgcggtct | 300  |
| cgattttcta ctatcttgcc acgacttaca tcccgcagct cccctaccct cttgcctacg | 360  |
| ttgcctggcc ggtttactgg tttgttcaag gctgtgtgtt catggggctt tggcttattg | 420  |
| ctcatgaatg cggtcacat gccttcagt atcatgtgtg gctggaggat tcgatcgggt   | 480  |
| ttgttttaca ttcatgcctt ttgacctt acttttcatg gaagataagc caccgtcgac   | 540  |
| atcatgcgaa cacgggttcg cttgagcacg atgaggttta tgtcccgaag acaaaggcta | 600  |
| aactcgggtc ctccgcgttt tacctggaca acccaatcgg tcgaacccta accctgatgg | 660  |
| ttaagctcac tcttgatgg tacatctact tggcgatcaa tgctgcggga agaccttacg  | 720  |
| aaaaattcgc aagccattac gaccccagaa gtgagatgtt ttccgataac gagagggtct | 780  |
| tgatactcat gtccgatatc ggacttttga gcttctcctt cttgctttac aaagtggcca | 840  |
| tggttcaagg gtttgcttgg gtcttctgcg tctacggagg tgcgttgatg gtgatgaacg | 900  |
| cttttctcgt gacgattacg taccttcacc ataccaccc ttctttgccc cactacgacg  | 960  |
| actccgaatg gaactggatg aaaggcgcgt tcgcgaccgt cgatagggat tacggagtag | 1020 |
| ttctaaacaa ggtgttcac aacatcaccg acacgcgtgt ttacacat ttgttctcgt    | 1080 |

## pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| acattcctca ttatcatgcc atggaagcca cgaaggctat ccggccggtt ctcggggagt  | 1140 |
| tttaccagat cgataggact ccgttttttcg tggcgttgtg gagggaatcc aagagctgct | 1200 |
| tgttcattga gcccgatgaa agcgatgaga agaacaaagg tatctactgg tacaggagta  | 1260 |
| agtactgaag gaatagttaa agctaagaag ggatgt                            | 1296 |

&lt;210&gt; 10

&lt;211&gt; 1316

&lt;212&gt; DNA

<213> *Carthamus tinctorius*

&lt;400&gt; 10

|                                                                    |      |
|--------------------------------------------------------------------|------|
| acttcgccct ctgttatctg gttgaattat ccgatcaagc ggcatcggac aacaatatgg  | 60   |
| gcggaggagg gtgcataccc gcaagcaaaa ccgaagccca acaaacaac catctctcga   | 120  |
| gagttcctta cgaaaaaccg gccttcactg ttgggtgacat caagcgagtc atccctcccc | 180  |
| actgttttca acgttcctt atccgttcct tctcttatgt cgcatatgac cttgccatag   | 240  |
| ccttcctgtc gtaccacctc gccaccacct acttcaccg tctctcgccg cccctctcct   | 300  |
| acctcgcgat gtccgcttac tggatcgttc aagggtgtgt gtcaccggg gtctgggtca   | 360  |
| tagcccacga gtgcgggtcac catgcgttta gcgaccacca atgggtcgat gacacagtcg | 420  |
| gcctcatcct ccactcggcc ttactcgtcc cctacttctc ctggaaatgc agccaccgcc  | 480  |
| gccaccacct caacaccgcg tcaactggaac gcgatgaagt gttcgtcccc aaacccaaat | 540  |
| cgaaaatccc gtgggtactct aaataactga acaaccacc gggccgtttg ataatcgtgt  | 600  |
| tcaccacgct cgttctcggc tggccgttgt acctggcctt taacgtttcc ggacggccct  | 660  |
| acgaccgttt tgcctgccac tacgctccta acagcccgat cttcacaac cgtgaacgcc   | 720  |
| tccaaatctg gatttccgat gccgggatta tcgcagtttc gtatctgctt taccgtatgg  | 780  |
| ctttagccaa aagcgtcgtc tgggtcgttt gcatttatgg tgtcccgttg ctgatcgtga  | 840  |
| acgggttttt ggtcatgatc acatacctt aacacacca cccttcattg cccactatg     | 900  |
| acgattccga gtgggactgg ctccgggggg ctttagcgac cgtggaccgt gactacggtc  | 960  |
| tcctgaacaa ggtcttccat aacataaccg acacgcacgt ggtgcaccat ctgttctcga  | 1020 |
| ccatgccgca ttatcatgcc atggaggcaa cgaaggcggc cgagccggtg cttgggggggt | 1080 |
| actatcggtt tgacgacacc ccgttttacg tggccatgtg gagggaggcg aaggagtgtc  | 1140 |

pctau2013000426-seq1

|                                                                   |      |
|-------------------------------------------------------------------|------|
| tctatgtgga gaccgatgag aagaaaggtg gcgtgttttg gtacaagaat aagtactgat | 1200 |
| gcgagcgcga tggatggatg tcgagttcgc ttttagtgaa agagtagcta ttttatcgtg | 1260 |
| tgtttcgtgt ttaagtaagt gaacttttcg gtatcgtgta ggatgtatgt gtatgg     | 1316 |

<210> 11  
 <211> 1213  
 <212> DNA  
 <213> *Carthamus tinctorius*

|                                                                               |      |
|-------------------------------------------------------------------------------|------|
| <400> 11<br>actcacaata acttcatctc tctctaaggt tgatcatata tcaacaacat gggagcaggt | 60   |
| ggtcggatgt cggattcatc tgaaagcaca gatatcctga aacgtgtccc cattgatcca             | 120  |
| cccttcacct taagtgatct aaagaaagca atcccggctc attgcttcga gagatctctc             | 180  |
| atccgttcat ctactatgt tgttcatgat ctcgttgttg cctatgtctt ttactacctt              | 240  |
| gccgacacat atattcctca gcttcctact ccactggcgt acctagcctg gcccatttac             | 300  |
| tggttttgtc aagctagcat ctgcactggc ttatgggtca tcggtcatga atgtggtcac             | 360  |
| catgccttta gtgagcatca gtggattggg gacattgttg gaatggtcct ccattctgct             | 420  |
| ctttttacgc cttatttcgc ctggaaatac agccatcgaa atcaccatgc aaacacgaac             | 480  |
| tcactcgata acgatgaagt ttacattcct aaacgtaagt ccaagatcgc gattttattca            | 540  |
| aaactttctca acaaccacc tggtcgagtt ttaccttgg tttttagggt gaccctagga              | 600  |
| tttcctttgt acctcctcac aaatatttct ggcaagaaat acggaagggt tgccaaccac             | 660  |
| tttgatccaa tgagtccaat tttcactgag cgtgaacgaa ttcaggtttt ggtatcggat             | 720  |
| cttggatttc ttgccgttat ttacgcaatc aagcttgctg tagcagcaaa aggagccgct             | 780  |
| tgggtaattt ccatgtacgg aattccagtc ataggcgtac atgttttctt tgttttgatc             | 840  |
| acttatctac atcacacca tctctctttg cctcattacg attcaaccga atggaactgg              | 900  |
| atccgaggag ccttatcgac aatcgacagg gactttggat tcctgaacag ggttttccat             | 960  |
| gacgttacac acactcacgt attgcatcat ttgatctcat acattccaca ttatcatgcc             | 1020 |
| aaggaggcaa gggatgcgat caagcctatt ttgggcgagt actataagat cgataggacc             | 1080 |
| ccaattttca aagctatgtg gagggaggcc aaagaatgca tctacattga acctgatgag             | 1140 |

## pctau2013000426-seq1

gacagcgagc acaagggtac atactggtac cataaaatgt gatcgatggc cgaagacatt 1200  
gtatggctag tag 1213

<210> 12

<211> 1143

<212> DNA

<213> *Carthamus tinctorius*

<400> 12

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ccttcccact gtttcaaccg ttcccttatc cgttccttct cttacattgt ctatgacctt 180  
gctatagcct tcgtcttcta ctaccttgcc accacctaca tccaccgtct cccaaccctt 240  
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tgggtcgtag cccacgaatg cggccaccat gccttttagcg attatcaatg ggttgacgac 360  
accgtgggct tcatagtcca ctctttttta ctcgctccct acttctctgtg gaaatacagt 420  
catcggcgcc accactcgaa cactgcatcg ctcgagcgcg atgaagtctt tgtcccaaag 480  
cccagatcaa aactcccttg gtactcgaaa tacttgaaca acccgcttg ccgcatcatc 540  
agcctgttcg ccactctcac tctcggctgg cccttgtact tgtctttcaa cgtctctgga 600  
agaccctatg accgcttcgc ctgccactac gtcctaaca gcccgatata caaccaccgt 660  
gaacgcctcc agatttggct ctctgatgtg ggaatcgtgg ccatggcatt cgtcctttac 720  
cgtgttgac tggtgaaagg cgtgagctgg gtggtctgtg tgtatgggat accgttgttg 780  
atcgtgaacg ggttcctggt gttgatcacg ttccttcagc atacgcaccc ttcgttgcct 840  
cactacgacg ggtcggaatg ggactggctg agaggggctg tggcgacggt ggaccgagac 900  
tacggtgtgc tgaacaaggt gttccataac atcacggaca cgcacgtggt gcaccatctg 960  
ttctcgacaa tgccgcatta tcatgcatg gaggaacga gggcggtgaa ggggttgctg 1020  
ggggagtatt atcagtttga cgagaccccg ttttacgcag cgatgtggag agaggcaaag 1080  
gagtgtctgt ttgtggaggc agatgaaggg aaaggaggtg tgttttggtg caagaataag 1140  
taa 1143

pctau2013000426-seq1

<210> 13  
 <211> 1152  
 <212> DNA  
 <213> Carthamus tinctorius

<400> 13  
 atgggtgcag gcgggcgaat gtcgaacccc tccgagggcg aaaagaaaac cgaactcgaa 60  
 ggcatccaac gagtcccata ccaaaaacct ccgttcacag tcggggatgt caaaaaagcc 120  
 atccccacctc attgtttcaa tcgatcggtc atccgctctt tctcgtacgt cgttttacgac 180  
 cttaccatcg catccatctt gtactacatc gccacaactt tcatcccgct cctcccgcac 240  
 ccgctcgcct acgtggcctg gcccatTTac tgggccgttc agggctgtgt catgaccggg 300  
 gtctgggtca tagcccacga atgcggccat cagcctTTa gcgactacca atggctcgac 360  
 gacactgtcg gccttatcct acattctgtt cttcttgttc cttacttctc gtggaaatac 420  
 agccaccgcc gccaccactc caacaccggc tcgattgagc acgacgaggt cttcgtcccg 480  
 aaactcaaat ccgggggtccg gtccaccgca aaatacctaa acaaccccc cggccggatc 540  
 ttgacccttc ttgtcacct caccctcggc tggccgttgt acctcatgtt caacgtctcc 600  
 ggccgctact acgaccgctt tgcctgccat tttgaccaa acagcccat ctactcgaac 660  
 cgtgaacgtg cccagatctt catctccgac gccgggatct tcgccgtcct ctacgggctc 720  
 taccggctcg cggcgggtcaa agggctcgtg tgggtcctga ccgtctatgc cggaccgttg 780  
 ctcgtgggtca acgggtttct tgtcctgac acgttcctcc agcacacca cccgtcgttg 840  
 ccgcactacg actcaaccga gtgggactgg ctccgtgggg ccctggccac catcgaccgt 900  
 gactacggga ttttaaaca ggtgttccac aacatcaccg acaccacgt gaccaccat 960  
 ctgttttcga cgatgccga ttatcacgcg atggaggcca cgaaggcgat aattccgatc 1020  
 ctcggggatt attatcagtt cgatgggacg tcagttttta aggcgatgta tagggagacg 1080  
 aaggagtga tttatgtgga taaagatgag gaggtgaagg atggggttta ctggtaccgg 1140  
 aataagattt ga 1152

<210> 14  
 <211> 1128  
 <212> DNA  
 <213> Carthamus tinctorius

pctau2013000426-seq1

<400> 14

|                                                                     |      |
|---------------------------------------------------------------------|------|
| atgaacgtgg cggctctcagg ttccgaaaaa cccacgcct tcaagcgcgt tccggtctcc   | 60   |
| aagcctccat tcgagcttag cgatctcaag aaagcagtcc caccacactg tttcaaacga   | 120  |
| tctcttgtag gctcctttgc agcccttttc cgtgatataca taattgtcac cgccttatac  | 180  |
| tacctggccg caaccatcat tccggtgctc cctaaacccc ttacatacgt agcgtggccg   | 240  |
| ctttattgggt tcttccaagg agcctatctt atggggtttgt gggtcattgg ccacgagtgc | 300  |
| ggccatcatg gcttcagcga gtaccaatgg ctcatgaca ccgttggttt catcgtccac    | 360  |
| tccttcattc tcactccgta ctttgggttc aaatacagcc accgaacca ccacgccaac    | 420  |
| accaactcca tcgaatacga tgagggttgg atccctaaac gcaagtctga taaattgtac   | 480  |
| tcggaagttc tcaacaaccc actcggatcc tttattgtat ttgtgttcaa gatcgttctt   | 540  |
| ggatttcctt tgtacttcgt attcaatctt tacggaagga agtacgagaa gggaatcaca   | 600  |
| agccactttt acccgtatag tcccatcttt aacgatagcg agcgttcca gatctttctc    | 660  |
| accgatcttg gagtctttgg cactttgtac ggtgtctacc gtcttgcggt gataaagggc   | 720  |
| acggaatggg tgatcaactt ctacggaatg ccgatccttt tcatgagtgg gtttttcatc   | 780  |
| ttgttgacat atcttcacca caccaccct tccatccctc actacgattc cacggaatgg    | 840  |
| gactggctta gaggtgcttt ggccacggtg gaccgaaact ttgggttctt gaaccatgct   | 900  |
| ttccatgacg taactcgaac tcacgccgta caccatctgt tcccaaccat cccacattac   | 960  |
| catactttcg aggcaaggca ggccgtgatg ccgatcttgg gcgattacta caaatacgac   | 1020 |
| gataccccga ttctacaggc catatggaga gaaacaaaag attgcatctt tatcgaacct   | 1080 |
| gaagaggtta atggagagaa aaagggtatc tactggtttt acaaatag                | 1128 |

<210> 15

<211> 1125

<212> DNA

<213> Carthamus tinctorius

<400> 15

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| atggatgttg cggcaagctc cgagaaaccg cagccttta aacgtgttcc ggtctcgaag   | 60  |
| cctccattcg agcttagcga tctcaagaaa gcagttccac cacactgttt caagcgtatc  | 120 |
| cttgtgcgct cctttgcagc ccttttccgt gatatacataa tcgtctccgc cttatactat | 180 |

pctau2013000426-seq1

|                                                                   |      |
|-------------------------------------------------------------------|------|
| ctggccgcaa ccgtcattcc ggtgctccct aaaccctta cgtacgtagc atggccgctt  | 240  |
| tattggttct tccaaggagc ttatcttatg ggtttgtggg tcattggcca cgaatgcggc | 300  |
| catcatggct tcagcgagta ccaatggctc gatgacaccg ttggtttcat cgtccactcc | 360  |
| ttgattctca ctccgtactt tgggttcaaa tacagccacc gaaccacca cgccaacacc  | 420  |
| aactccatcg aatacgatga ggtttggatc cctaaacgca agtctgataa attgtactcg | 480  |
| gaaatcctca acaaccact cggatccttt gttgtatttg tgttcaagat cgttcttgga  | 540  |
| tttcccttgt acttcgtgtt caatctttat ggaaggaagt acgagaaggg aatcacgagc | 600  |
| cacttttacc catacagtcc catcttcaac gatagcgagc gtttccagat ctttctcacc | 660  |
| gatctcggag tctttggcac tttgtatggg gtctaccgtc ttgcgttgat aaagggcacg | 720  |
| gaatgggtga tcaacttcta cggaatgccg atccttttca tgagtgggtt tttcatcttg | 780  |
| ttgacatatc ttcaccacac ccacccttcc atccctcact acgattccac cgaatgggac | 840  |
| tggcttagag gtgctttggc cacggtggac cgaaactttg ggttcttgaa ccatgccttc | 900  |
| catgacgtaa ctcgaactca cgcggtacac catctgttcc caaccatccc acattaccat | 960  |
| actttcgagg caaggcaggc cgtgatgccg atcttgggtg attactaaa atacgatgat  | 1020 |
| accccgattc tagaggccgt ttggagagag acgaaagact gcatctttat cgaacctgaa | 1080 |
| gaggttaacg gggagaaaaa gggatatttac tggttctata agtag                | 1125 |

<210> 16

<211> 1128

<212> DNA

<213> Carthamus tinctorius

<400> 16

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| atgggagcag gagggcgaat gaatgacgac gctacgaggg aaagagatgt cttcaaacad  | 60  |
| gttcccgtcg agaagccttc attcgggatt gctgatctca agaaggccat accaccacac  | 120 |
| tgtttcaagc ggtccctaac cacctctttc tactaccttt tccgtgattt gggctctcatc | 180 |
| tacgctttct actatattgc aacaaaatac attaccatc tcccccaacc ctactcgttt   | 240 |
| gtggcatggc cactttattg gatcgcccaa ggtgccattt gcatgggttt atggaatatc  | 300 |
| gtccatgatt gtggatcatc ctgcttttagc gattatcaat ggcttgatga caccattggc | 360 |
| ttcatctgcc actcctttct gtcactcca tacttctctt tcaaatacag tcaccgtact   | 420 |

pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| catcatgcta acaccagttc actcgaaagg gatgaagtat gggccccaaa acgcaagcac  | 480  |
| gatacttgggt tttatgaggt tctcagcaac ccagtgggaa gctttatcat gcttgtgttt | 540  |
| aggttatttt ttggctttcc cttgtacttt atgttcaatc ttcattggtag gatatacaag | 600  |
| ggtttcccta gccacttcaa cccgttaggc cccatcttca acgaccgaga gcgtgctaata | 660  |
| atctggctct ctgatgccgg agttcttacc gttgtctatg cgctctaccg tattggggca  | 720  |
| aaagaaggtc tccagtcggt acttttcgtc tatatttatc cttgatggc tatgagtgcc   | 780  |
| tttttcatca tggtcacata tctacaccac actcatcctt ccatcgctca ctacgattcg  | 840  |
| tcggaatggg attggttgag aggtgctttg tcaaccgtgg atagggatta tgggatcttg  | 900  |
| aacaacatct tccatgacgt aacaagtgc catgtggtgc accatctatt ctgagcatt    | 960  |
| ccgattaca atacggtaga ggccacacag tacatcaagc caatcttggg cgactactac   | 1020 |
| aactacgatt atactcccat tctcaaggca atctggagag acacaaaaga atgtctcttt  | 1080 |
| attgaagaag atccagagaa aaaaggtgta tactggttcc acaagtag               | 1128 |

<210> 17  
 <211> 1131  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                               |     |
|-------------------------------------------------------------------------------|-----|
| <400> 17<br>atgggagctg gtggtcggat gaacgatgct accactgaca aagatgttct gaagcgtgtc | 60  |
| cccaccgcaa aaactccttt cgagattagt gatctcaaga aagcaatacc gccacattgc             | 120 |
| ttcaagcga ctcttaccac ctctttctac taccttttcc gtgatatttg catatgctat              | 180 |
| acctggtacc acctcggatc aaattacctc cccctcctcc ctaaaccct tgcctacata              | 240 |
| gcatggccac tttattgggt ctgccaaggt agtagtttca tgggtatatg gagcataggt             | 300 |
| cacgatttgg gccatcatgc ctttagcgag taccagtggc ttgatgatgc acttggtttc             | 360 |
| gtaatccact ccgctttcct cactccatac ttttctttca aatacagtca ccgtagccac             | 420 |
| catgctcaca ccaactcaat ggaatacgat gaggtatgga tccctaaaag aaaggccgat             | 480 |
| accatgtatt ctgaagtcct caacaacca ctcggaact tgttcatgac tgctgttagg               | 540 |
| ttgcttttca gctttcccat gtactttacc ttcaacattc atggaaggcc gtataacggg             | 600 |

## pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| tttgaagcc acttctaccc acaaagtcct atgttcaatg acagtgagcg caaactagtg   | 660  |
| tggctctctg atgccggaat gggtgcagct ttctatgggc tttaacaagat tgcggcaagc | 720  |
| acgagtgcaa catgggttggt ttgcatctac ggagctcctt tgttggttat gaatgctcat | 780  |
| ttcatctttt tcactttcct acaccatagc catgtttccc ttgccacta cgattcaaga   | 840  |
| gagtgggatt ggatcagagg tgctctatcc acggtggata gaaactacgg aatcctaaac  | 900  |
| actgttttcc atgatgtgac ctgtgctcac gtgggtgcatc atctgatctc aaccattccg | 960  |
| cattaccata cagtagaggc caccaatgca gtcaagccca tcttaggtga ctactacaaa  | 1020 |
| tacgatgata caccatcct aaaggctttc tggagagaaa caaagaactg catttacgtc   | 1080 |
| gagccagatg aaggtgcaga ggatagtggc gtttactggt tccgtaggta g           | 1131 |

&lt;210&gt; 18

&lt;211&gt; 1119

&lt;212&gt; DNA

&lt;213&gt; Carthamus tinctorius

&lt;400&gt; 18

|                                                                     |     |
|---------------------------------------------------------------------|-----|
| atgggagccg gtggccgaat gaagaccgag gagaaagaca tcatgaaaca tgtcccgggt   | 60  |
| gcgaaacccc cattcgggat ctccgatctc aagaaagcca taccaccgca ctgtttcaaa   | 120 |
| cgatctctta tatggtcggt tggctccttc tttcgagatc ttatcgtaat ctacagcttc   | 180 |
| tactatctcg catcgacttt cattcctttg ctccctcccg ccctctcgta cgtagcgtgg   | 240 |
| ccgctatact ggttcgccca gggcagcatt ctaatgggggt tttggatcct tggatcatgaa | 300 |
| tgtggatcatc atgccttttag cgagtaccaa tgggtggacg atgccgttgg cttcttcatc | 360 |
| cattcgggtt gcctcacccc gtacttttcc ttcaagtaca gccaccgtag ccaccacgcc   | 420 |
| cacacgaact ccatcgagta cgacgaggtc tacatcccga aacgcaaggc cgacaccttc   | 480 |
| tactccgagt tcctaaacaa cggacccgga aacgtcttca ccctctcct acggacgacg    | 540 |
| ctcggcttac cttgtacct gatcttcaac acctacggcc gcgactacaa cggattcgca    | 600 |
| aaccatttcc taccgcaatc gggcattttc aacgacagcg agcgcgcca ggtcgtgctc    | 660 |
| tcggacgtcg ggatcttcgc ggtcctctac gcgctctacc ggctcgtcct catccaaggc   | 720 |
| ctgaaatcga cgatcttcct ccaggggatt ccgttggttcg tgatgagcgg cttcttcatc  | 780 |
| ttcttgactt acctaaacca caccatccg gcgatcgctc actacgactc caccgaatgg    | 840 |

pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| gactggctaa gaggcgccct atcgaccatc gatagggatt tcggaatctt gaaccggggtt | 900  |
| ttccacaacg cgaatcacac ccacgggatc caccatctgt tccccacgat cccgcattac  | 960  |
| cacgcgatcg aggcccggga ggccgtgaag cccatcttag gcgactacta catgtacgac  | 1020 |
| gataccccga tactaaaggc catgtggaga gacacaaagg agtgcattcta cgtcgaaccg | 1080 |
| gacgacgaga agaaagggtg ttactgggtat ttcaagtag                        | 1119 |

<210> 19  
 <211> 1149  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                    |      |
|--------------------------------------------------------------------|------|
| <400> 19                                                           |      |
| atgggttccg gtggccgagc aacggagaga agtaaccccg agagtgaagt cgtcgtgaag  | 60   |
| cgggccccat cctcgaagcc cccattcacc cttggcgaca taaagaaagc cataccacca  | 120  |
| cactgcttcg agcgatccct catccgatct tcctcctacc ttttcttgga cctctttcta  | 180  |
| tcattccctct ttactacgt ggcgccgctc tacatcccc gccttcgat ctctctttcg    | 240  |
| tacgtggcat ggcccgttta ttggatcctc caaggagcg tccagatggg tttgtgggtc   | 300  |
| attggccacg agtgcggcca ccaagccttc agtgactacc cgtggtttaa tgacaccatt  | 360  |
| ggttaccttc tacacaccgg tatgcttgcc cttattttct cttggaaata cagccaccgt  | 420  |
| cgccaccatt ccaacacggg ctactcgag ctcgacgaat ctttcgtccc caaaaagaag   | 480  |
| tccagcctaa actccgtagc caggctgctc aacacccac ccggccgtct ctttaggctt   | 540  |
| acgatcttat gcaccgtagg ctggctcttg tacatttgct tcaatgtttc cggccgaag   | 600  |
| tatgagaagt tcgccaacca ctttgacca aagagtccta tctacaacga ccgcgagcgc   | 660  |
| tttcaaattc tcctgaccga catcgggctt ctagtaacaa gctacgggct ctacaaactg  | 720  |
| gccttagccc aaggattcgc ttggctcata accatctact ttgctccttt ggttattggt  | 780  |
| tacgggttcc tgggtggtgat cacttggttg caccacacc accggtcgct gccacactac  | 840  |
| gactccaccg agtggaaactg gttgagggga gctttgtcga cgatggatcg agattacggc | 900  |
| gttttcaaca ccgttctaca tcacatcacc gacacgcacg ttgcgcacca tttgttcttc  | 960  |
| accattcctc attataatgc catggaggcc acgaaagcaa tcaaaccctt cttaggagaa  | 1020 |

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|                                                                   |      |
|-------------------------------------------------------------------|------|
| tactatcagt tcgacgacac cccgataatc aaagcgatgt ggagagaagc taccgagtgc | 1080 |
| ttctttgttg aagctgatga aggggaaggc aagagcaaag gtgtctattg gttcaacaat | 1140 |
| aagatgtaa                                                         | 1149 |

<210> 20  
 <211> 1164  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                    |      |
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| atgggtgccg gtggccgatc gaatcctcgc gatctagacg ttaagaaatt cgataccgta  | 60   |
| gaaggtatca agagagcccc aacttcaaaa cctccattca cattagcaga tatcaagaaa  | 120  |
| gccataccac cccattgctt ccaaagatcc ctaattcgat ccttttcgta tctcgtatac  | 180  |
| gacctaccg cggtctcgat ttttactat cttgccacga cttacatccc gcagctcccc    | 240  |
| tacctcttg cctacgttg cttggccggt tactggtttg ttcaaggctg tgtgttcatg    | 300  |
| gggctttggc ttattgctca tgaatgcggt caccatgcct tcagtgatca tgtgtggctg  | 360  |
| gaggattcga tcgggtttgt ttacattca tgccttttga ccccttactt ttcattggaag  | 420  |
| ataagccacc gtcgacatca tgcgaacacg gggttcgcttg agcacgatga ggtttatgtc | 480  |
| ccgaagacaa aggctaaact cggtgcctcc gcgttttacc tggacaaccc aatcggtcga  | 540  |
| accctaacc tgatgggtta gctcactctt ggatgggtaca tctacttggc gatcaatgct  | 600  |
| gcgggaagac cttacgaaaa attcgcaagc cattacgacc ccagaagtga gatgttttcc  | 660  |
| gataacgaga gggctttgat actcatgtcc gatatcggac ttttgagctt ctccttcttg  | 720  |
| ctttacaaag tggccatggt tcaagggttt gcttgggtct tctgcgtcta cggaggtgcg  | 780  |
| ttgatggtga tgaacgcttt tctcgtgacg attacgtacc ttcaccatac ccacccttct  | 840  |
| ttgccccact acgacgact cgaatggaac tggatgaaag gcgcattcgc gaccgtcgat   | 900  |
| agggattacg gagtagttct aaacaagggt ttccacaaca tcaccgacac gcatgtttta  | 960  |
| caccatttgt tctcgtacat tcctcattat catgccatgg aagccacgaa ggctatccgg  | 1020 |
| ccggttctcg gggagtttta ccagatcgat aggactccgt ttttcgtggc gttgtggagg  | 1080 |
| gaatccaaga gctgcttggt cattgagccc gatgaaagcg atgagaagaa caaaggatc   | 1140 |
| tactgtaca ggagtaagta ctga                                          | 1164 |

pctau2013000426-seq1

<210> 21  
 <211> 1143  
 <212> DNA  
 <213> Carthamus tinctorius

<400> 21  
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 tcgagagttc cttacgaaaa accggccttc actgttggtg acatcaagcg agtcatccct 120  
 cccactgtt ttcaacgttc cttatccgt tccttctctt atgtcgcata tgaccttgcc 180  
 atagccttcc tgtcgtagca cctcgccacc acctacttcc accgtctctc gccgccctc 240  
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 gtcataagccc acgagtgcgg tcacatgcg tttagcgacc accaatgggt cgatgacaca 360  
 gtcggcctca tcctccactc ggccttactc gtcccctact tctcctggaa atgcagccac 420  
 cgccgccacc acctcaacac cgcgtcactg gaacgcgatg aagtgttcgt ccccaaacc 480  
 aaatcgaaaa tcccgtagga ctctaaatac ctgaacaacc caccgggccg tttgataatc 540  
 gtgttcacca cgctcgttct cggctggccg ttgtacctgg cttttaacgt ttccggacgg 600  
 ccctacgacc gttttgcctg ccactacgct cctaacagcc cgatcttcac aaaccgtgaa 660  
 cgcttcaaaa tctggatttc cgatgccggg attatcgag tttcgtatct gctttaccgt 720  
 atggcttttag ccaaaagcgt cgcttgggtc gtttgcattc atggtgtccc gttgctgac 780  
 gtgaacgggt ttttggatc gatcacatac cttcaacaca cccacccttc attgccccac 840  
 tatgacgatt ccgagtggga ctggctccgg ggggcttttag cgaccgtgga ccgtgactac 900  
 ggtctcctga acaaggtctt ccataacata accgacacgc acgtggtgca ccatctgttc 960  
 tcgacatgc cgcattatca tgccatggag gcaacgaagg cggtcgagcc ggtgcttggg 1020  
 ggggtactatc gggttgacga caccctgtt tacgtggcca tgtggaggga ggcgaaggag 1080  
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 tga 1143

<210> 22  
 <211> 1134  
 <212> DNA

pctau2013000426-seq1

<213> Carthamus tinctorius

<400> 22

|                                                                     |      |
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| atgggagcag gtggtcggat gtcggattca tctgaaagca cagatatacct gaaacgtgtc  | 60   |
| cccatatgatc cacccttcac ctttaagtgat ctaaagaaag caatcccggc tcattgcttc | 120  |
| gagagatctc tcatccgttc atcttactat gttgttcatg atctcgttgt tgcctatgtc   | 180  |
| ttttactacc ttgccgacac atatattcct cagcttccta ctccactggc gtacctagcc   | 240  |
| tggcccatth actggttttg tcaagctagc atctgcactg gcttatgggt catcggtcat   | 300  |
| gaatgtggtc accatgcctt tagtgagcat cagtggattg gtgacattgt tggaatggtc   | 360  |
| ctccattctg ctctttttac gccttatttc gcctggaaat acagccatcg aaatcaccat   | 420  |
| gcaaacacga actcactcga taacgatgaa gtttacattc ctaaagctaa gtccaagatc   | 480  |
| gcgatttatt caaaacttct caacaacca cctggtcgag tttttacctt ggtttttagg    | 540  |
| ttgaccctag gatttccttt gtacctctc acaaatatth ctggcaagaa atacggaagg    | 600  |
| tttgccaacc actttgatcc aatgagtcca atthtactg agcgtgaacg aattcaggtt    | 660  |
| ttggtatcgg atcttggtat tcttgccgtt atthacgcaa tcaagcttgc tgtagcagca   | 720  |
| aaaggagccg cttgggtaat ttccatgtac ggaattccag tcataggcgt acatgttttc   | 780  |
| tttgttttga tcacttatct acatcacacc catctctctt tgcctcatta cgattcaacc   | 840  |
| gaatggaact ggatccgagg agccttatcg acaatcgaca gggacttttg attcctgaac   | 900  |
| agggttttcc atgacgttac acacactcac gtattgcatc atthgatctc atacattcca   | 960  |
| cattatcatg ccaaggaggc aagggatgcg atcaagccta ttttgggcga gtactataag   | 1020 |
| atcgatagga cccaattth caaagctatg tggagggagg ccaaagaatg catctacatt    | 1080 |
| gaacctgatg aggacagcga gcacaagggt acatactggt accataaaat gtga         | 1134 |

<210> 23

<211> 1083

<212> DNA

<213> Carthamus tinctorius

<400> 23

|                                                                     |     |
|---------------------------------------------------------------------|-----|
| gtgcattctc tcattctcaa aacctttctg ctattcatct gatcaatgta ttcagttatg   | 60  |
| gttcgatgat cgacgattat tgtttgttat ttttaatttha atthtttaggt tgatttagct | 120 |

pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| gcattgttgg tcgatgaata gatctgtgga ttacggctctt ctgcagtttc agtttgattt | 180  |
| atttcagtcc gtttttctcc tgtaaatttg tgtatctatc tgtgttgcat gtaattttgt  | 240  |
| ttcctttaga ttatagaaat gaaaatccat aattttaggg ctgcttgtct tgtttggatt  | 300  |
| tgtgttatta ggttttgatc acagtaactt ccgtacgttt aatatgttaa atgctaaaca  | 360  |
| aaatgattta ttttttatat ttatggcttc tcggtggctg gatttgtgtt tttaatcct   | 420  |
| gaagtttctg tatacaatga tttcgaattt tggcgattag gcatctcttt actttggaag  | 480  |
| gaatttcaga ttttcttaat ctcatagaga agtgctgatt gggaatttgc ttaaagatat  | 540  |
| aagcactttt cagttcattg attgtttgat ggacatcaga tggttttttt gctgatgcca  | 600  |
| tgatgtctat tgtgttgaat gtatcttcaa taagtgcctt caatatgtat agcaaaactg  | 660  |
| agctaaggct gtgtttggca aactacctga taagctatat gttgactgat aagctagttt  | 720  |
| gtgaataaat tatgtttggc aaaaactagc atatgagtat gtaaaatgac taaaaaggt   | 780  |
| atcttgggggt ataatagtta atattgataa ggatagaatt ggagaaggct acaaaaagcc | 840  |
| cttgaaatgc tactccaact agtgtttcaa taagctggct tatggctctat ccaaacatgt | 900  |
| actagattat catctagctt atttttgcc aacacagcct aaatgtttga tggctgatgg   | 960  |
| ctggcacttg acaatttgac atcattataa ctgaaacaat aatattcacc ttacataac   | 1020 |
| attcaccttt agccaaaaac tagatgttca cctacgaact gatccatatg gaacattttg  | 1080 |
| cag                                                                | 1083 |

<210> 24  
 <211> 3092  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| <400> 24                                                          |     |
| gtgagatcga tcatcttctt tcataaacat ctgattagta ataatcggta tccaagctgt | 60  |
| atgtgtgtga atttgtggaa ttttgaattt gaatgtcgtg atttgaatct gttaggattt | 120 |
| agggttgaaa gagtcggttt acttgataga tctgaatttt ttttaagagt tagtagcttc | 180 |
| ggatgttgat ttaggtggaa tgcggcttaa gtttttgcgg atctgagcac cggttcttct | 240 |
| aaatctaaag gttactgatt ataatcgatc ttctttcgat ttctatgaat ttactccttt | 300 |
| tttttttcct tggaaaaagg tgctactact ttatttgagc tgagatctgc gctgcttttg | 360 |

pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| attccgattc cctttttgga tcaaatagtt gaaaactgca atgtttatgg tcaaattttt  | 420  |
| gcttctaatt tttccaggag catgcctaata tatgcttctt attggattgg aattcagaaa | 480  |
| taaaattaag tttgaatatt atacaggtat tagattcaaa gaagtggaat aaaaagcaga  | 540  |
| ggcttaatag atgctagctt gtagatgaag gacctgtttt aagtagtcat taaaacttgc  | 600  |
| atgtcccaaa ataagcaaac atttacacta tttgatattt tgatttaaaa agggaatcca  | 660  |
| atgttactga atgaagcaaa ccacaatcaa tatcaacaca gatccagctc aaatggaaaa  | 720  |
| actaaatttt tttctccaag aagaaacctt aacaaaaaga gttaaagttaa caaaaatgga | 780  |
| agaaggcttg tatagttcct gtttgttttg ataataatca gtaacctcta attcttacac  | 840  |
| cataaataat caagatttaa aaaactgggtg ctcagatcta caaaactgaa gccatatact | 900  |
| accttaaatc agattgattg ttagttactt aagagttata cttatttctg tgttttgtcc  | 960  |
| tcagtctgtt tcatatgggtg gacctgtcac atgggcctaa accaaacttt tgtaacttgg | 1020 |
| tgaattgatt ttattaagcc aagttgtacc atccttttca gaaagccctc tcattaatgg  | 1080 |
| catattccca aaagcaaata cttttgggggt catatgaaat gatcttttct gagcttatca | 1140 |
| aaaaagacgc tgaactgtta gccataaatt agtagctttt tgaaaagcta tattaggtag  | 1200 |
| cggttgaata acccccggat gttatttctt ttcttccagt tatgccgttt attattttcc  | 1260 |
| gagtaatcta aagcaagtta ctttaggtca tatttattgc aaacttaccg cccgcccgcc  | 1320 |
| cattaccaac ggagctttat tataggtcat attacgttgt cgttttatca actggcttgt  | 1380 |
| caaacatatc tttggttcta agtggctcca cttgttccta tgattctcca ttttactata  | 1440 |
| ctagatattt atgatgctga attgggtcaac ataaggttga gtagttgcat aacttttggg | 1500 |
| tgctttgaaa gattgcagtc aaaattggag tattggcatg aatagtcctt ttttttcttt  | 1560 |
| tttggtgaaa gcagtatgtt ttgcattatt gaagtttttt attccaagaa aacgtggctc  | 1620 |
| ttttttcttt tttggtaaat ttggacctat ttttgaatga ttagcctaata tttttcaaat | 1680 |
| ccatgtgcat tgaaggcact ataaacatga cttcttatgg gttatcatca taagtgttac  | 1740 |
| ataattggaa aaggtaattg ctttataact acccttataa attttttgtc acaaagtagc  | 1800 |
| taaaaaacca caagatactt ttcttgctga ttcgcaagct gcgaaacggg cttgcggttc  | 1860 |
| cacatctctt ggcgttggct tgttctttta tgcgtagacg caagagacta aaataccccc  | 1920 |

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|                                                                    |      |
|--------------------------------------------------------------------|------|
| aacttgcggt tttttattgg tttttgtgat ggaccactt tttccactgg attggtagat   | 1980 |
| tttctgagaa ctcgcttata aaagtgcctt gtagcgttta cttgcgtttt gatagccgtt  | 2040 |
| tttttgtttt ttgtttttct agtgaggcgg ccatttgaga tgataacctt ttttctttat  | 2100 |
| ttcttttctt tggggcaaga ggtcactttc cacttggtt cactatggtt ttattattat   | 2160 |
| ttttctaadc gtggatgtct aggtcagatt taacacttga tagcccctaa ttctcgtatt  | 2220 |
| cttcttggtc ctatatataa attttctttg caaatcaacc atggttctta tgagtttgtg  | 2280 |
| acaccccacc cccctcattc ggcatggtgt caatatgtgt ggattctttt tctgtatttt  | 2340 |
| ttttttgtaa aacaaacaaa atatatttat gatgatttag gtggtatact gtacttgcac  | 2400 |
| aaacagtttc gagtttctta gctgcactgt aggagttaca acttacaatt cttttatggt  | 2460 |
| atctttaatg gacaacatca agtcttacac caaatccata aaaattagtg tagaatttgg  | 2520 |
| agaaaacaat actccaatgg ataacactga attttgcacc aaaatgtaag gacgcttttg  | 2580 |
| gaattgggtg tgaaaaagat ttttggtgaaa ctacaaaaat cagttttcta atttacatag | 2640 |
| aagttacaaa acaaaatttt ttggaactaa acacgttttc taaattttca tttttcttgg  | 2700 |
| aaaactgtga aattttccgc tagtataaat gaacagtgtc acaccaaatt tggcgtatga  | 2760 |
| tttgatttct ccctcggaga tttggtgtaa gatttgggtc cgtgattgga gatggtctta  | 2820 |
| gggattaagt tctttgtgac gtgtgaacac ttggtccata aaccagccac ctaacaagcc  | 2880 |
| gttgtgtatc tgattgatta taaaccgttt ttccacaaaa aggaaatcaa tcccttttcg  | 2940 |
| gtaagcagat tttgtgataa tactgatcac atggtcctgt ctaatttagt cgatcctttt  | 3000 |
| caatgctagc tggtcctttt gcattctttc aatagctaaa catcaattca gcctctttta  | 3060 |
| atgtcataaa gagtaattca tatcttttgc ag                                | 3092 |

<210> 25  
 <211> 2247  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| <400> 25                                                          |     |
| gttcgttttt tcttcttagt gaatctcctt caatcaaatg catatttttg atgttgatat | 60  |
| gatgatctta tcatgaatca tgtttaattc agtgattaat tccgaaatta gtaatatagg | 120 |

## pctau2013000426-seq1

|                                                                   |      |
|-------------------------------------------------------------------|------|
| taataggttt gatgattata atccattccg agattgattt gattgattga tggattgatt | 180  |
| gagctgcatt gttaattgat atgaagatct ctggattctg atcttcta atcgttcaattt | 240  |
| cgacctgttt tactcgattc gtctacaaat ttgcgtatgt gttttgtttc tggctgtgaa | 300  |
| tcaatgcact tgcgtatgaa attgttgat tctgtttaga tttccgtttc ttaataattt  | 360  |
| atttgatttg aggatgat attgaaat tgatattagt gcttcatttt gatctgctaa     | 420  |
| accttgatga ttgtgataat ttatgtattc attctccttt tatttacaat gaaattgtta | 480  |
| aaaaggcttt ttgctgttaa tcaaataat gagagatcag gagaaagcaa atttgataaa  | 540  |
| aaactcatgt atcagaatct atgaagccag tattatcaat gatttgctat gaatttgtaa | 600  |
| aaagacaatt ccaaggaaag aaatgttttt ttttttttcc ttttagtttc aggatgacta | 660  |
| caaaaaatgt taactaagaa tagaaaagt tacatgtttt ttgttgccat agaaagttat  | 720  |
| gaagatagct tgttttgttt ttcttctttg gtaagtgata ataaatgctt ctatgatcaa | 780  |
| tcacatatga aatttcccta aatttctttg aagtaaagtc atgaaatgta tgtcctaagt | 840  |
| caactggaac agggaaacga cggatcgatg cttcggcata tcgagttgta ctctgcgc   | 900  |
| gtttgattct ttagacgaat aagacaaacc tttgagtttg aaaataatgt agtttgtgct | 960  |
| cataatacag ctgaaagaga tggttgttga atttagtagc ccataaaca ttttgaattt  | 1020 |
| tagagctttg aatgctaccc tctagtgaat ttgtattcta gccatcatat ttataatttt | 1080 |
| gctgtaaatg aaccatcata cttgttaaaa tgcaagtgtt actaaaaatg taaaagatac | 1140 |
| cataatgtgc agatttaatt agaagtctga ttgagtaaca cagaatttaa tggttcttat | 1200 |
| atccatgtaa tcgtatgtta ccgttatgct gtgttagcta tactgtgtaa atatgtatag | 1260 |
| tttaggagct gtttctgtta ctggttgtct agttcatagt ctagtctagg tatatatttc | 1320 |
| gatttcgatt cagagatgaa tagagtttcc tctgaagaaa ccaaactgaa agggtagcct | 1380 |
| aaactcaca ccaatttctt gatcagattg atagcagact aggaagcatc atgattcatg  | 1440 |
| catcaagtac atgaaatcca taatcagaaa caaagatgta aagagtagga tttagtgcct | 1500 |
| atttagaatt catatatatg attcatggac tgatgaagca gtaaaagtct aaaaaagga  | 1560 |
| tgctaaaatc aacctgaatt tttgtatgag aacttatgag aagatccatc acctgttca  | 1620 |
| gagatctgaa tctgagctat agttcaatat ttatatccac atttataatg gaacaaacat | 1680 |

pctau2013000426-seq1

|                                                                    |      |
|--------------------------------------------------------------------|------|
| agctattgat gtgttatgga agaacaatct ataccatctt ccaagtttta ctaaaatctc  | 1740 |
| aacaaatcag tcgaattcaa ttgccaataa cttttgaacc ttcattgtaaa gatcaagttg | 1800 |
| ttcatcattt tgccttattg taaagaattt attacttaac tcgagccaga cttttgtggc  | 1860 |
| attgatcatc gtttattggc ttatcttgat tataaactcg atgcttggtg gagattatat  | 1920 |
| gtctttccgt taacaatcct gtcttttcct tttgttgtct cttacaccgt cttctcaaat  | 1980 |
| gctaaatgga tattccaaag catcagaaac aaatcccata tggttcaatg tctcttctga  | 2040 |
| aattgctcca ttcttattgc ttagtttgat atagttaaaa aaacctcaat cttgctatgt  | 2100 |
| tttagtatca tatatttgct gtcatttgca aatttacata aaacttagta tttgttattc  | 2160 |
| agagaatatc tctctatgcc attagttgat cctagattac agtcttaatt tacagattgc  | 2220 |
| ataaaatata taactgcat cttacag                                       | 2247 |

<210> 26

<211> 1195

<212> DNA

<213> Carthamus tinctorius

<400> 26

|                                                                    |     |
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| agctgaagaa aagaagaacc cactcgaccg agtcccttgt gcaaaacctc ctttcaccat  | 120 |
| cagtgacatc aagcaagcca ttccttccca ctgtttcaac cgttccctta tccgttcctt  | 180 |
| ctcttacatt gtctatgacc ttgctatagc cttcgtcctc tactaccttg ccaccaccta  | 240 |
| catccaccgt ctccaaccc ctttctccta tctagcgtgg ctggcttact ggatcgtcca   | 300 |
| aggctgcgtg ctcaccggag cttgggtcgt agcccacgaa tgcggccacc atgccttttag | 360 |
| cgattatcaa tgggttgacg acaccgtggg cttcatagtc cactcctttt tactcgtccc  | 420 |
| ctacttctcg tggaaatata gtcacggcg ccaccactcg aacactgcat cgctcgagcg   | 480 |
| cgatgaggtc tttgtcccaa agcccagatc aaaactccct tgggtactga aatacttgaa  | 540 |
| caacccgcct ggccgcatca tcagcctgtt cgccactctc actctcggct ggcccttgta  | 600 |
| cttgtctttc aacgtctctg gaagacctac aaccgtttcg cctgccacta tgctcccaac  | 660 |
| agcccgattt acaaccatcg cgaacgcctc cagatttggc tctctgacgt ggggatcgtg  | 720 |
| gcatgtcgt tcaccttta ccgtgttgcg ctggtgaaag gcgtgagctg ggtggtctgt    | 780 |

pctau2013000426-seq1

gtgtatggga taccgttggt gatcgtgaac gggttcctgg tgttgatcac gttccttcag 840  
 catacgcacc cttcgttgcc tcactacgac gggtcggaat gggactggct gagaggagcg 900  
 ttggcgacgg tggaccgaga ctacggtgtg ctgaacaagg tgttccataa catcacggac 960  
 acgcacgtgg tgcaccatct gttctcgaca atgccgcatt atcatgcgat ggaggcaacg 1020  
 agggcggtga ggggggttgct gggggagtat tatcagtttg acgagacccc gttttacgca 1080  
 gcgatgtgga gaggggcaaa ggagtgtctg tttgtggagg cagatgaagg gaaaggaggt 1140  
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<210> 27  
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 <212> PRT  
 <213> Carthamus tinctorius

<400> 27

Met Gly Gly Gly Gly Cys Met Ser Ala Ser Glu Thr Lys Ala Glu Glu  
 1 5 10 15

Lys Lys Asn Pro Leu Asp Arg Val Pro Cys Ala Lys Pro Pro Phe Thr  
 20 25 30

Ile Ser Asp Ile Lys Gln Ala Ile Pro Ser His Cys Phe Asn Arg Ser  
 35 40 45

Leu Ile Arg Ser Phe Ser Tyr Ile Val Tyr Asp Leu Ala Ile Ala Phe  
 50 55 60

Val Phe Tyr Tyr Leu Ala Thr Thr Tyr Ile His Arg Leu Pro Thr Pro  
 65 70 75 80

Phe Ser Tyr Leu Ala Trp Leu Ala Tyr Trp Ile Val Gln Gly Cys Val  
 85 90 95

Leu Thr Gly Ala Trp Val Val Ala His Glu Cys Gly His His Ala Phe  
 100 105 110

Ser Asp Tyr Gln Trp Val Asp Asp Thr Val Gly Phe Ile Val His Ser

## pctau2013000426-seq1

115

120

125

Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser His Arg Arg His  
 130 135 140

His Ser Asn Thr Ala Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys  
 145 150 155 160

Pro Arg Ser Lys Leu Pro Trp Tyr Ser Lys Tyr Leu Asn Asn Pro Pro  
 165 170 175

Gly Arg Ile Ile Ser Leu Phe Ala Thr Leu Thr Leu Gly Trp Pro Leu  
 180 185 190

Tyr Leu Ser Phe Asn Val Ser Gly Arg Pro Tyr Asp Arg Phe Ala Cys  
 195 200 205

His Tyr Ala Pro Asn Ser Pro Ile Tyr Asn His Arg Glu Arg Leu Gln  
 210 215 220

Ile Trp Leu Ser Asp Val Gly Ile Val Ala Met Ala Phe Val Leu Tyr  
 225 230 235 240

Arg Val Ala Leu Val Lys Gly Val Ser Trp Val Val Cys Val Tyr Gly  
 245 250 255

Ile Pro Leu Leu Ile Val Asn Gly Phe Leu Val Leu Ile Thr Phe Leu  
 260 265 270

Gln His Thr His Pro Ser Leu Pro His Tyr Asp Gly Ser Glu Trp Asp  
 275 280 285

Trp Leu Arg Gly Ala Leu Ala Thr Val Asp Arg Asp Tyr Gly Val Leu  
 290 295 300

Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Val His His Leu  
 305 310 315 320

Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Arg Ala Val

pctau2013000426-seq1

325

330

335

Lys Gly Leu Leu Gly Glu Tyr Tyr Gln Phe Asp Glu Thr Pro Phe Tyr  
340 345 350

Ala Ala Met Trp Arg Glu Ala Lys Glu Cys Leu Phe Val Glu Ala Asp  
355 360 365

Glu Gly Lys Gly Gly Val Phe Trp Tyr Lys Asn Lys  
370 375 380

<210> 28

<211> 383

<212> PRT

<213> Carthamus tinctorius

<400> 28

Met Gly Ala Gly Gly Arg Met Ser Asn Pro Ser Glu Gly Glu Lys Lys  
1 5 10 15

Thr Glu Leu Glu Gly Ile Gln Arg Val Pro Tyr Gln Lys Pro Pro Phe  
20 25 30

Thr Val Gly Asp Val Lys Lys Ala Ile Pro Pro His Cys Phe Asn Arg  
35 40 45

Ser Val Ile Arg Ser Phe Ser Tyr Val Val Tyr Asp Leu Thr Ile Ala  
50 55 60

Ser Ile Leu Tyr Tyr Ile Ala Thr Thr Phe Ile Pro Leu Leu Pro His  
65 70 75 80

Pro Leu Ala Tyr Val Ala Trp Pro Ile Tyr Trp Ala Val Gln Gly Cys  
85 90 95

Val Met Thr Gly Val Trp Val Ile Ala His Glu Cys Gly His His Ala  
100 105 110

Phe Ser Asp Tyr Gln Trp Leu Asp Asp Thr Val Gly Leu Ile Leu His  
115 120 125

pctau2013000426-seq1

Ser Val Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser His Arg Arg  
130 135 140

His His Ser Asn Thr Gly Ser Ile Glu His Asp Glu Val Phe Val Pro  
145 150 155 160

Lys Leu Lys Ser Gly Val Arg Ser Thr Ala Lys Tyr Leu Asn Asn Pro  
165 170 175

Pro Gly Arg Ile Leu Thr Leu Leu Val Thr Leu Thr Leu Gly Trp Pro  
180 185 190

Leu Tyr Leu Met Phe Asn Val Ser Gly Arg Tyr Tyr Asp Arg Phe Ala  
195 200 205

Cys His Phe Asp Pro Asn Ser Pro Ile Tyr Ser Asn Arg Glu Arg Ala  
210 215 220

Gln Ile Phe Ile Ser Asp Ala Gly Ile Phe Ala Val Leu Tyr Gly Leu  
225 230 235 240

Tyr Arg Leu Ala Ala Val Lys Gly Leu Val Trp Val Leu Thr Val Tyr  
245 250 255

Ala Gly Pro Leu Leu Val Val Asn Gly Phe Leu Val Leu Ile Thr Phe  
260 265 270

Leu Gln His Thr His Pro Ser Leu Pro His Tyr Asp Ser Thr Glu Trp  
275 280 285

Asp Trp Leu Arg Gly Ala Leu Ala Thr Ile Asp Arg Asp Tyr Gly Ile  
290 295 300

Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Thr His His  
305 310 315 320

Leu Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala  
325 330 335

pctau2013000426-seq1

Ile Ile Pro Ile Leu Gly Asp Tyr Tyr Gln Phe Asp Gly Thr Ser Val  
 340 345 350

Phe Lys Ala Met Tyr Arg Glu Thr Lys Glu Cys Ile Tyr Val Asp Lys  
 355 360 365

Asp Glu Glu Val Lys Asp Gly Val Tyr Trp Tyr Arg Asn Lys Ile  
 370 375 380

<210> 29

<211> 381

<212> PRT

<213> Carthamus tinctorius

<400> 29

Met Gly Ala Gly Gly Arg Met Asn Ala Glu Val Ser Gly Ser Glu Lys  
 1 5 10 15

Pro His Ala Phe Lys Arg Val Pro Val Ser Lys Pro Pro Phe Glu Leu  
 20 25 30

Ser Asp Leu Lys Lys Ala Val Pro Pro His Cys Phe Lys Arg Ser Leu  
 35 40 45

Val Arg Ser Phe Ala Ala Leu Phe Arg Asp Ile Ile Ile Val Thr Ala  
 50 55 60

Leu Tyr Tyr Leu Ala Ala Thr Ile Ile Pro Val Leu Pro Lys Pro Leu  
 65 70 75 80

Thr Tyr Val Ala Trp Pro Leu Tyr Trp Phe Phe Gln Gly Ala Tyr Leu  
 85 90 95

Met Gly Leu Trp Val Ile Gly His Glu Cys Gly His His Gly Phe Ser  
 100 105 110

Glu Tyr Gln Trp Leu Asp Asp Thr Val Gly Phe Ile Val His Ser Leu  
 115 120 125

pctau2013000426-seq1

Ile Leu Thr Pro Tyr Phe Gly Phe Lys Tyr Ser His Arg Thr His His  
130 135 140

Ala Asn Thr Asn Ser Ile Glu Tyr Asp Glu Val Trp Ile Pro Lys Arg  
145 150 155 160

Lys Ser Asp Lys Leu Tyr Ser Glu Ile Leu Asn Asn Pro Leu Gly Ser  
165 170 175

Phe Val Val Phe Val Phe Lys Ile Val Leu Gly Phe Pro Leu Tyr Phe  
180 185 190

Val Phe Asn Leu Tyr Gly Arg Lys Tyr Glu Lys Gly Ile Thr Ser His  
195 200 205

Phe Tyr Pro Tyr Ser Pro Ile Phe Asn Asp Ser Glu Arg Phe Gln Ile  
210 215 220

Phe Leu Thr Asp Leu Gly Val Phe Gly Thr Leu Tyr Gly Val Tyr Arg  
225 230 235 240

Leu Ala Leu Ile Lys Gly Thr Glu Trp Val Ile Asn Phe Tyr Gly Met  
245 250 255

Pro Ile Leu Phe Met Ser Gly Phe Phe Ile Leu Leu Thr Tyr Leu His  
260 265 270

His Thr His Pro Ser Ile Pro His Tyr Asp Ser Thr Glu Trp Asp Trp  
275 280 285

Leu Arg Gly Ala Leu Ala Thr Val Asp Arg Asn Phe Gly Phe Leu Asn  
290 295 300

His Ala Phe His Asp Val Thr Arg Thr His Ala Val His His Leu Phe  
305 310 315 320

Pro Thr Ile Pro His Tyr His Thr Phe Glu Ala Arg Gln Ala Val Met  
325 330 335

pctau2013000426-seq1

Pro Ile Leu Gly Asp Tyr Tyr Lys Tyr Asp Asp Thr Pro Ile Leu Glu  
340 345 350

Ala Val Trp Arg Glu Thr Lys Asp Cys Ile Phe Ile Glu Pro Glu Glu  
355 360 365

Val Asn Gly Glu Lys Lys Gly Ile Tyr Trp Phe Tyr Lys  
370 375 380

<210> 30

<211> 380

<212> PRT

<213> Carthamus tinctorius

<400> 30

Met Gly Ala Gly Gly Arg Met Asp Val Ala Ala Ser Ser Glu Lys Pro  
1 5 10 15

His Ala Phe Lys Arg Val Pro Val Ser Lys Pro Pro Phe Glu Leu Ser  
20 25 30

Asp Leu Lys Lys Ala Val Pro Pro His Cys Phe Lys Arg Ser Leu Val  
35 40 45

Arg Ser Phe Ala Ala Leu Phe Arg Asp Ile Ile Ile Val Ser Ala Leu  
50 55 60

Tyr Tyr Leu Ala Ala Thr Val Ile Pro Val Leu Pro Lys Pro Leu Thr  
65 70 75 80

Tyr Val Ala Trp Pro Leu Tyr Trp Phe Phe Gln Gly Ala Tyr Leu Met  
85 90 95

Gly Leu Trp Val Ile Gly His Glu Cys Gly His His Gly Phe Ser Glu  
100 105 110

Tyr Gln Trp Leu Asp Asp Thr Val Gly Phe Ile Val His Ser Leu Ile  
115 120 125

pctau2013000426-seq1

Leu Thr Pro Tyr Phe Gly Phe Lys Tyr Ser His Arg Thr His His Ala  
130 135 140

Asn Thr Asn Ser Ile Glu Tyr Asp Glu Val Trp Ile Pro Lys Arg Lys  
145 150 155 160

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

Val Val Phe Val Phe Lys Ile Val Leu Gly Phe Pro Leu Tyr Phe Val  
180 185 190

Phe Asn Leu Tyr Gly Arg Lys Tyr Glu Lys Gly Ile Thr Ser His Phe  
195 200 205

Tyr Pro Tyr Ser Pro Ile Phe Asn Asp Ser Glu Arg Phe Gln Ile Phe  
210 215 220

Leu Thr Asp Leu Gly Val Phe Gly Thr Leu Tyr Gly Val Tyr Arg Leu  
225 230 235 240

Ala Leu Ile Lys Gly Thr Glu Trp Val Ile Asn Phe Tyr Gly Met Pro  
245 250 255

Ile Leu Phe Met Ser Gly Phe Phe Ile Leu Leu Thr Tyr Leu His His  
260 265 270

Thr His Pro Ser Ile Pro His Tyr Asp Ser Thr Glu Trp Asp Trp Leu  
275 280 285

Arg Gly Ala Leu Ala Thr Val Asp Arg Asn Phe Gly Phe Leu Asn His  
290 295 300

Ala Phe His Asp Val Thr Arg Thr His Ala Val His His Leu Phe Pro  
305 310 315 320

Thr Ile Pro His Tyr His Thr Phe Glu Ala Arg Gln Ala Val Met Pro  
325 330 335

pctau2013000426-seq1

Ile Leu Gly Asp Tyr Tyr Lys Tyr Asp Asp Thr Pro Ile Leu Glu Ala  
340 345 350

Val Trp Arg Glu Thr Lys Asp Cys Ile Phe Ile Glu Pro Glu Glu Val  
355 360 365

Asn Gly Glu Lys Lys Gly Ile Tyr Trp Phe Tyr Lys  
370 375 380

<210> 31

<211> 375

<212> PRT

<213> Carthamus tinctorius

<400> 31

Met Gly Ala Gly Gly Arg Met Asn Asp Asp Ala Thr Arg Glu Arg Asp  
1 5 10 15

Val Phe Lys His Val Pro Val Glu Lys Pro Ser Phe Gly Ile Ala Asp  
20 25 30

Leu Lys Lys Ala Ile Pro Pro His Cys Phe Lys Arg Ser Leu Thr Thr  
35 40 45

Ser Phe Tyr Tyr Arg Phe Arg Asp Leu Gly Leu Ile Tyr Ala Phe Tyr  
50 55 60

Tyr Ile Ala Thr Lys Tyr Ile Thr His Leu Pro Gln Pro Tyr Ser Phe  
65 70 75 80

Val Ala Trp Pro Leu Tyr Trp Ile Ala Gln Gly Ala Ile Cys Met Gly  
85 90 95

Leu Trp Asn Ile Val His Asp Cys Gly His His Cys Phe Ser Asp Tyr  
100 105 110

Gln Trp Leu Asp Asp Thr Ile Gly Phe Ile Cys His Ser Phe Leu Leu  
115 120 125

Thr Pro Tyr Phe Ser Phe Lys Tyr Ser His Arg Thr His His Ala Asn

## pctau2013000426-seq1

130

135

140

Thr Ser Ser Leu Glu Arg Asp Glu Val Trp Val Pro Lys Arg Lys His  
 145 150 155 160

Asp Thr Trp Phe Tyr Glu Val Leu Ser Asn Pro Val Gly Ser Phe Ile  
 165 170 175

Met Leu Val Phe Arg Leu Phe Phe Gly Phe Pro Leu Tyr Phe Met Phe  
 180 185 190

Asn Leu His Gly Arg Ile Tyr Lys Gly Phe Pro Ser His Phe Asn Pro  
 195 200 205

Leu Gly Pro Ile Phe Asn Asp Arg Glu Arg Ala Asn Ile Trp Leu Ser  
 210 215 220

Asp Ala Gly Val Leu Thr Val Val Tyr Ala Leu Tyr Arg Ile Gly Ala  
 225 230 235 240

Lys Glu Gly Leu Gln Trp Val Leu Phe Val Tyr Ile Tyr Pro Leu Met  
 245 250 255

Ala Met Ser Ala Phe Phe Ile Met Phe Thr Tyr Leu His His Thr His  
 260 265 270

Pro Ser Ile Ala His Tyr Asp Ser Ser Glu Trp Asp Trp Leu Arg Gly  
 275 280 285

Ala Leu Ser Thr Val Asp Arg Asp Tyr Gly Ile Leu Asn Asn Ile Phe  
 290 295 300

His Asp Val Thr Ser Ala His Val Val His His Leu Phe Ser Ser Ile  
 305 310 315 320

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

Gly Glu Tyr Tyr Asn Tyr Asp Tyr Thr Pro Ile Leu Lys Ala Ile Trp

## pctau2013000426-seq1

340

345

350

Arg Asp Thr Lys Glu Cys Leu Phe Ile Glu Glu Asp Pro Glu Lys Lys  
                   355                                  360                                  365

Gly Val Tyr Trp Phe His Lys  
           370                                  375

&lt;210&gt; 32

&lt;211&gt; 376

&lt;212&gt; PRT

&lt;213&gt; Carthamus tinctorius

&lt;400&gt; 32

Met Gly Ala Gly Gly Arg Met Asn Asp Ala Thr Thr Asp Lys Asp Val  
   1                  5                                  10                                  15

Leu Lys Arg Val Pro Thr Ala Lys Thr Pro Phe Glu Ile Ser Asp Leu  
                   20                                  25                                  30

Lys Lys Ala Ile Pro Pro His Cys Phe Lys Arg Ser Leu Thr Thr Ser  
                   35                                  40                                  45

Phe Tyr Tyr Leu Phe Arg Asp Ile Cys Ile Cys Tyr Thr Trp Tyr His  
           50                                  55                                  60

Leu Gly Ser Asn Tyr Leu Pro Leu Leu Pro Lys Pro Leu Ala Tyr Ile  
   65                  70                                  75                                  80

Ala Trp Pro Ile Tyr Trp Phe Cys Gln Gly Ser Ser Phe Met Gly Ile  
                   85                                  90                                  95

Trp Ser Ile Gly His Asp Leu Gly His His Ala Phe Ser Glu Tyr Gln  
                   100                                  105                                  110

Trp Leu Asp Asp Ala Leu Gly Phe Val Ile His Ser Ala Phe Leu Thr  
           115                                  120                                  125

Pro Tyr Phe Ser Phe Lys Tyr Ser His Arg Ser His His Ala His Thr  
           130                                  135                                  140

pctau2013000426-seq1

Asn Ser Met Glu Tyr Asp Glu Val Trp Ile Pro Lys Arg Lys Ala Asp  
145 150 155 160

Thr Met Tyr Ser Glu Val Leu Asn Asn Pro Leu Gly Asn Leu Phe Met  
165 170 175

Thr Val Val Arg Leu Leu Phe Ser Phe Pro Met Tyr Phe Thr Phe Asn  
180 185 190

Ile His Gly Arg Pro Tyr Asn Gly Phe Val Ser His Phe Tyr Pro Gln  
195 200 205

Ser Pro Met Phe Asn Asp Ser Glu Arg Lys Leu Val Trp Leu Ser Asp  
210 215 220

Ala Gly Met Val Ala Ala Phe Tyr Gly Leu Tyr Lys Ile Ala Gln Ser  
225 230 235 240

Thr Ser Ala Thr Trp Leu Phe Cys Ile Tyr Gly Ala Pro Leu Leu Val  
245 250 255

Met Asn Ala His Phe Ile Phe Phe Thr Phe Leu His His Ser His Val  
260 265 270

Ser Leu Ala His Tyr Asp Ser Arg Glu Trp Asp Trp Ile Arg Gly Ala  
275 280 285

Leu Ser Thr Val Asp Arg Asn Tyr Gly Ile Leu Asn Thr Val Phe His  
290 295 300

Asp Val Thr Cys Ala His Val Val His His Leu Ile Ser Thr Ile Pro  
305 310 315 320

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

Asp Tyr Tyr Lys Tyr Asp Asp Thr Pro Ile Leu Lys Ala Phe Trp Arg  
340 345 350

pctau2013000426-seq1

Glu Thr Lys Asn Cys Ile Tyr Val Glu Pro Asp Glu Gly Ala Glu Asp  
 355 360 365

Ser Gly Val Tyr Trp Phe Arg Arg  
 370 375

<210> 33  
 <211> 372  
 <212> PRT  
 <213> Carthamus tinctorius

<400> 33

Met Gly Ala Gly Gly Arg Met Lys Thr Glu Glu Lys Asp Ile Met Lys  
 1 5 10 15

His Val Pro Val Ala Lys Pro Pro Phe Gly Ile Ser Asp Leu Lys Lys  
 20 25 30

Ala Thr Pro Pro His Cys Phe Lys Arg Ser Leu Ile Trp Ser Phe Gly  
 35 40 45

Ser Phe Phe Arg Asp Leu Ile Val Ile Tyr Ser Phe Tyr Tyr Leu Ala  
 50 55 60

Ser Thr Phe Ile Pro Leu Leu Pro Pro Ala Leu Ser Tyr Val Ala Trp  
 65 70 75 80

Pro Leu Tyr Trp Phe Ala Gln Gly Ser Ile Leu Met Gly Phe Trp Ile  
 85 90 95

Leu Gly His Glu Cys Gly His His Ala Phe Ser Glu Tyr Gln Trp Val  
 100 105 110

Asp Asp Ala Val Gly Phe Phe Ile His Ser Val Cys Leu Thr Pro Tyr  
 115 120 125

Phe Ser Phe Lys Tyr Ser His Arg Ser His His Ala His Thr Asn Ser  
 130 135 140

pctau2013000426-seq1

Ile Glu Tyr Asp Glu Val Tyr Ile Pro Lys Arg Lys Ala Asp Thr Phe  
145 150 155 160

Tyr Ser Glu Phe Leu Asn Asn Gly Pro Gly Asn Val Phe Thr Leu Leu  
165 170 175

Leu Arg Thr Thr Leu Gly Leu Pro Leu Tyr Leu Ile Phe Asn Thr Tyr  
180 185 190

Gly Arg Asp Tyr Asn Gly Phe Ala Asn His Phe Leu Pro Gln Ser Gly  
195 200 205

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

Ile Phe Ala Val Leu Tyr Ala Leu Tyr Arg Leu Val Leu Ile Gln Gly  
225 230 235 240

Leu Lys Ser Thr Ile Phe Leu Gln Gly Ile Pro Leu Phe Val Met Ser  
245 250 255

Gly Phe Phe Ile Phe Leu Thr Tyr Leu Asn His Thr His Pro Ala Ile  
260 265 270

Ala His Tyr Asp Ser Thr Glu Trp Asp Trp Leu Arg Gly Ala Leu Ser  
275 280 285

Thr Ile Asp Arg Asp Phe Gly Ile Leu Asn Arg Val Phe His Asn Ala  
290 295 300

Asn His Thr His Gly Ile His His Leu Phe Pro Thr Ile Pro His Tyr  
305 310 315 320

His Ala Ile Glu Ala Arg Glu Ala Val Lys Pro Ile Leu Gly Asp Tyr  
325 330 335

Tyr Met Tyr Asp Asp Thr Pro Ile Leu Lys Ala Met Trp Arg Asp Thr  
340 345 350

pctau2013000426-seq1

Lys Glu Cys Ile Tyr Val Glu Pro Asp Asp Glu Lys Lys Gly Val Tyr  
 355 360 365

Trp Tyr Phe Lys  
 370

<210> 34  
 <211> 382  
 <212> PRT  
 <213> Carthamus tinctorius

<400> 34

Met Gly Ser Gly Gly Arg Ala Thr Glu Arg Ser Asn Pro Glu Ser Glu  
 1 5 10 15

Val Val Val Lys Arg Ala Pro Ser Ser Lys Pro Pro Phe Thr Leu Gly  
 20 25 30

Asp Ile Lys Lys Ala Ile Pro Pro His Cys Phe Glu Arg Ser Leu Ile  
 35 40 45

Arg Ser Ser Ser Tyr Leu Phe Leu Asp Leu Phe Leu Ser Ser Leu Phe  
 50 55 60

Tyr Tyr Val Ala Ala Val Tyr Ile Pro Arg Leu Pro Ile Ser Leu Ser  
 65 70 75 80

Tyr Val Ala Trp Pro Val Tyr Trp Ile Leu Gln Gly Ser Val Gln Met  
 85 90 95

Gly Leu Trp Val Ile Gly His Glu Cys Gly His Gln Ala Phe Ser Asp  
 100 105 110

Tyr Pro Trp Phe Asn Asp Thr Ile Gly Tyr Leu Leu His Thr Gly Met  
 115 120 125

Leu Ala Pro Tyr Phe Ser Trp Lys Tyr Ser His Arg Arg His His Ser  
 130 135 140

pctau2013000426-seq1

Asn Thr Gly Ser Leu Glu Leu Asp Glu Ser Phe Val Pro Lys Lys Lys  
145 150 155 160

Ser Ser Leu Asn Ser Val Ala Arg Leu Leu Asn Thr Pro Pro Gly Arg  
165 170 175

Leu Phe Arg Leu Thr Ile Leu Cys Thr Val Gly Trp Leu Leu Tyr Ile  
180 185 190

Cys Phe Asn Val Ser Gly Arg Lys Tyr Glu Lys Phe Ala Asn His Phe  
195 200 205

Asp Pro Lys Ser Pro Ile Tyr Asn Asp Arg Glu Arg Phe Gln Ile Leu  
210 215 220

Leu Thr Asp Ile Gly Leu Leu Val Thr Ser Tyr Gly Leu Tyr Lys Leu  
225 230 235 240

Ala Leu Ala Gln Gly Phe Ala Trp Leu Ile Thr Ile Tyr Phe Ala Pro  
245 250 255

Leu Val Ile Val Tyr Gly Phe Leu Val Val Ile Thr Trp Leu His His  
260 265 270

Thr His Arg Ser Leu Pro His Tyr Asp Ser Thr Glu Trp Asn Trp Leu  
275 280 285

Arg Gly Ala Leu Ser Thr Met Asp Arg Asp Tyr Gly Val Phe Asn Thr  
290 295 300

Val Leu His His Ile Thr Asp Thr His Val Ala His His Leu Phe Phe  
305 310 315 320

Thr Ile Pro His Tyr Asn Ala Met Glu Ala Thr Lys Ala Ile Lys Pro  
325 330 335

Phe Leu Gly Glu Tyr Tyr Gln Phe Asp Asp Thr Pro Ile Ile Lys Ala  
340 345 350

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Met Trp Arg Glu Ala Thr Glu Cys Phe Phe Val Glu Ala Asp Glu Gly  
355 360 365

Glu Gly Lys Ser Lys Gly Val Tyr Trp Phe Asn Asn Lys Met  
370 375 380

<210> 35

<211> 387

<212> PRT

<213> Carthamus tinctorius

<400> 35

Met Gly Ala Gly Gly Arg Ser Asn Pro Arg Asp Leu Asp Val Lys Lys  
1 5 10 15

Phe Asp Thr Val Glu Gly Ile Lys Arg Ala Pro Thr Ser Lys Pro Pro  
20 25 30

Phe Thr Leu Gly Asp Ile Lys Lys Ala Ile Pro Pro His Cys Phe Lys  
35 40 45

Arg Ser Leu Ile Arg Ser Phe Ser Tyr Leu Val Tyr Asp Leu Thr Ala  
50 55 60

Val Ser Ile Phe Tyr Tyr Leu Ala Thr Thr Tyr Ile Pro Gln Leu Pro  
65 70 75 80

Tyr Pro Leu Ala Tyr Val Ala Trp Pro Val Tyr Trp Phe Val Gln Gly  
85 90 95

Cys Val Phe Met Gly Leu Trp Leu Ile Ala His Glu Cys Gly His His  
100 105 110

Ala Phe Ser Asp His Val Trp Leu Glu Asp Ser Ile Gly Phe Val Leu  
115 120 125

His Ser Cys Leu Leu Thr Pro Tyr Phe Ser Trp Lys Ile Ser His Arg  
130 135 140

Arg His His Ala Asn Thr Gly Ser Leu Glu His Asp Glu Val Tyr Val

145                      150                      155                      160

Pro Ile Gly Arg Thr Leu Thr Leu Met Val Lys Leu Thr Leu Gly Trp  
180 185 190

Tyr Ile Tyr Leu Ala Ile Asn Ala Ala Gly Arg Pro Tyr Glu Lys Phe  
195 200 205

Ala Ser His Tyr Asp Pro Arg Ser Glu Met Phe Ser Asp Asn Glu Arg  
210 215 220

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Ile | Leu | Met | Ser | Asp | Ile | Gly | Leu | Leu | Ser | Phe | Ser | Phe | Leu |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |

Leu Tyr Lys Val Ala Met Val Gln Gly Phe Ala Trp Val Phe Cys Val  
245 250 255

Tyr Gly Gly Ala Leu Met Val Met Asn Ala Phe Leu Val Thr Ile Thr  
260 265 270

Tyr Leu His His Thr His Pro Ser Leu Pro His Tyr Asp Asp Ser Glu  
275 280 285

Trp Asn Trp Met Lys Gly Ala Phe Ala Thr Val Asp Arg Asp Tyr Gly  
290 295 300

Val Val Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Leu  
305 310 315 320

His His Leu Phe Ser Tyr Ile Pro His Tyr His Ala Met Glu Ala Thr  
325 330 335

Lys Ala Ile Arg Pro Val Leu Gly Glu Phe Tyr Gln Ile Asp Arg Thr  
340 345 350

Pro Phe Phe Val Ala Leu Trp Arg Glu Ser Lys Ser Cys Leu Phe Ile

355

360

365

Glu Pro Asp Glu Ser Asp Glu Lys Asn Lys Gly Ile Tyr Trp Tyr Arg  
 370 375 380

Ser Lys Tyr  
 385

<210> 36  
 <211> 380  
 <212> PRT  
 <213> Carthamus tinctorius

<400> 36

Met Gly Gly Gly Gly Cys Ile Pro Ala Ser Lys Thr Glu Ala Gln Gln  
 1 5 10 15

Thr Asn His Leu Ser Arg Val Pro Tyr Glu Lys Pro Ala Phe Thr Val  
 20 25 30

Gly Asp Ile Lys Arg Val Ile Pro Pro His Cys Phe Gln Arg Ser Leu  
 35 40 45

Ile Arg Ser Phe Ser Tyr Val Ala Tyr Asp Leu Ala Ile Ala Phe Leu  
 50 55 60

Ser Tyr His Leu Ala Thr Thr Tyr Phe His Arg Leu Ser Pro Pro Leu  
 65 70 75 80

Ser Tyr Leu Ala Trp Ser Ala Tyr Trp Ile Val Gln Gly Cys Val Leu  
 85 90 95

Thr Gly Val Trp Val Ile Ala His Glu Cys Gly His His Ala Phe Ser  
 100 105 110

Asp His Gln Trp Val Asp Asp Thr Val Gly Leu Ile Leu His Ser Ala  
 115 120 125

Leu Leu Val Pro Tyr Phe Ser Trp Lys Cys Ser His Arg Arg His His  
 130 135 140

## pctau2013000426-seq1

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

Lys Ser Lys Ile Pro Trp Tyr Ser Lys Tyr Leu Asn Asn Pro Pro Gly  
165 170 175

Arg Leu Ile Ile Val Phe Thr Thr Leu Val Leu Gly Trp Pro Leu Tyr  
180 185 190

Leu Ala Phe Asn Val Ser Gly Arg Pro Tyr Asp Arg Phe Ala Cys His  
195 200 205

Tyr Ala Pro Asn Ser Pro Ile Phe Thr Asn Arg Glu Arg Leu Gln Ile  
210 215 220

Trp Ile Ser Asp Ala Gly Ile Ile Ala Val Ser Tyr Leu Leu Tyr Arg  
225 230 235 240

Met Ala Leu Ala Lys Ser Val Ala Trp Val Val Cys Ile Tyr Gly Val  
245 250 255

Pro Leu Leu Ile Val Asn Gly Phe Leu Val Met Ile Thr Tyr Leu Gln  
260 265 270

His Thr His Pro Ser Leu Pro His Tyr Asp Asp Ser Glu Trp Asp Trp  
275 280 285

Leu Arg Gly Ala Leu Ala Thr Val Asp Arg Asp Tyr Gly Leu Leu Asn  
290 295 300

Lys Val Phe His Asn Ile Thr Asp Thr His Val Val His His Leu Phe  
305 310 315 320

Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Val Glu  
325 330 335

Pro Val Leu Gly Gly Tyr Tyr Arg Phe Asp Asp Thr Pro Phe Tyr Val  
340 345 350

pctau2013000426-seq1

Ala Met Trp Arg Glu Ala Lys Glu Cys Leu Tyr Val Glu Thr Asp Glu  
355 360 365

Lys Lys Gly Gly Val Phe Trp Tyr Lys Asn Lys Tyr  
370 375 380

<210> 37

<211> 379

<212> PRT

<213> Carthamus tinctorius

<400> 37

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

Ile Leu Lys Arg Val Pro Ile Asp Pro Pro Phe Thr Leu Ser Asp Leu  
20 25 30

Lys Lys Ala Ile Pro Ala Arg Cys Phe Glu Arg Ser Leu Ile Arg Ser  
35 40 45

Ser Tyr Tyr Val Val His Asp Leu Val Val Ala Tyr Val Phe Tyr Tyr  
50 55 60

Leu Ala Asp Thr Tyr Ile Pro Gln Leu Pro Thr Pro Leu Ala Tyr Leu  
65 70 75 80

Ala Trp Pro Ile Tyr Trp Phe Cys Gln Ala Ser Ile Cys Thr Gly Leu  
85 90 95

Trp Val Ile Gly His Glu Cys Gly His His Ala Phe Ser Glu Gln Gln  
100 105 110

Trp Ile Gly Asp Ile Val Gly Ile Val Leu His Ser Ala Leu Phe Thr  
115 120 125

Pro Tyr Phe Ala Trp Lys Tyr Ser His Arg Asn His His Ala Asn Thr  
130 135 140

pctau2013000426-seq1

Asn Ser Leu Asp Asn Asp Glu Val Tyr Ile Pro Lys Arg Lys Ser Lys  
145 150 155 160

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

Thr Leu Val Phe Arg Leu Thr Leu Gly Phe Pro Leu Tyr Leu Leu Thr  
180 185 190

Asn Ile Ser Gly Lys Lys Tyr Gly Arg Phe Ala Asn His Phe Asp Pro  
195 200 205

Met Ser Pro Ile Phe Thr Glu Arg Glu Arg Ile Gln Val Leu Val Ser  
210 215 220

Asp Leu Gly Ile Leu Ala Val Leu Tyr Ala Ile Lys Leu Ala Val Ala  
225 230 235 240

Ala Lys Gly Ala Ala Trp Val Ile Ala Met Tyr Gly Ile Pro Val Val  
245 250 255

Gly Val His Val Phe Phe Val Leu Ile Thr Tyr Leu His His Thr His  
260 265 270

Leu Ser Leu Pro His Tyr Asp Ser Thr Glu Trp Asp Trp Ile Arg Gly  
275 280 285

Ala Leu Ser Thr Ile Asp Arg Asp Phe Gly Phe Leu Asn Arg Val Phe  
290 295 300

His Asp Val Thr His Thr His Val Leu His His Leu Ile Ser Tyr Ile  
305 310 315 320

Pro His Tyr His Ala Lys Glu Ala Arg Asp Ala Ile Lys Pro Ile Leu  
325 330 335

Gly Glu Tyr Tyr Lys Ile Asp Arg Thr Pro Ile Phe Lys Ala Met Trp  
340 345 350

pctau2013000426-seq1

Arg Glu Ala Lys Glu Ser Ile Tyr Ile Glu Pro Asp Glu Asn Ser Glu  
355 360 365

His Lys Gly Thr Tyr Trp Tyr His Lys Glu Leu  
370 375

<210> 38  
<211> 244  
<212> PRT  
<213> Carthamus tinctorius

<400> 38

Met Gly Gly Gly Gly Cys Met Ser Ala Ser Glu Thr Lys Ala Glu Glu  
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Lys Lys Asn Pro Leu Asp Arg Val Pro Cys Ala Lys Pro Pro Phe Thr  
20 25 30

Ile Ser Asp Ile Lys Gln Ala Ile Pro Ser His Cys Phe Asn Arg Ser  
35 40 45

Leu Ile Arg Ser Phe Ser Tyr Ile Val Tyr Asp Leu Ala Ile Ala Phe  
50 55 60

Val Leu Tyr Tyr Leu Ala Thr Thr Tyr Ile His Arg Leu Pro Thr Pro  
65 70 75 80

Phe Ser Tyr Leu Ala Trp Leu Ala Tyr Trp Ile Val Gln Gly Cys Val  
85 90 95

Leu Thr Gly Ala Trp Val Val Ala His Glu Cys Gly His His Ala Phe  
100 105 110

Ser Asp Tyr Gln Trp Val Asp Asp Thr Val Gly Phe Ile Val His Ser  
115 120 125

Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser His Arg Arg His  
130 135 140

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His Ser Asn Thr Ala Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys  
145 150 155 160

Pro Arg Ser Lys Leu Pro Trp Tyr Ser Lys Tyr Leu Asn Asn Pro Pro  
165 170 175

Gly Arg Ile Ile Ser Leu Phe Ala Thr Leu Thr Leu Gly Trp Pro Leu  
180 185 190

Tyr Leu Ser Phe Asn Val Ser Gly Arg Pro Thr Thr Val Ser Pro Ala  
195 200 205

Thr Met Leu Pro Thr Ala Arg Phe Thr Thr Ile Ala Asn Ala Ser Arg  
210 215 220

Phe Gly Ser Leu Thr Trp Gly Ser Trp Pro Cys Arg Ser Ser Phe Thr  
225 230 235 240

Val Leu Arg Trp

<210> 39

<211> 501

<212> DNA

<213> Carthamus tinctorius

<400> 39

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cggttatacg ttgaagctgg acatgacatc gcagagatca ttggagacta gaggcgcc 180

catgatcaag accgacgata agtctacgtg acatgtcttt tcaatatttt ccacccggtt 240

gacggattgc agcatgatcc ttgctgaaat cacaagtggc tacttgctg cagactaaca 300

atggatgatg ctggattgga aaacaaagcg gcctgacatg ctcgctgatc tagaatcctt 360

ttggtctaag aagaattgtg cttgatgggc ttgtattccg ccaaaccctt tctattatat 420

cccatgaaat atgggctgat cgaactggat cgtagagac agctaataat tcatttgcaa 480

gaaactgccc ttaatcaagt a 501

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<210> 40  
 <211> 672  
 <212> DNA  
 <213> Carthamus tinctorius

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 taaagtgcac tgagccgagg agtccgctat tccgagcctg tttagaagtg actacttaac 180  
 agaactacat tcggtagtta agagtttctt gaccatgggtg gatactgctg ctactgcttc 240  
 gctgtttccg gtttcttcta cacaatcgga ctctgggtgct aagaactccg gtaagcatgg 300  
 aggtgggctg ggaagtgtgg atgtgcgcgg gattaagaca aaatcttctg ggagtttgca 360  
 agttaagaca catgcgagg cccccgaaa ggtgaatggt tctagaatag gtgtcatgga 420  
 tggcctcaag atggatgata attcgtcgtc ggctgccccg aggactttta tcaaccaatt 480  
 gcctgattgg agcatgcttc ttgctgccat cacgactatt ttcttggtg ctgagaagca 540  
 atggatgatg ctagagtgga agactaagcg gccggacatg ctttcggaaa tggatccttt 600  
 tggtttaggg agaattgtgg aggatagttt catatttcgt caaaactttt ctattaggtc 660  
 gtatgaaata gg 672

<210> 41  
 <211> 1671  
 <212> DNA  
 <213> Carthamus tinctorius

<400> 41  
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 attccactaa acaaatacaa aaggaatcca aattcaacat tcttcccaa tcgcacgcct 120  
 tagggatata tgctgttctt tggatcatctt tgaacaatta ttataattt ggtgagcacg 180  
 tctgaaacca ataggtttga ctgataaaca tacgggttaa tctgaatact ttaatcatgg 240  
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 ccaagaaatc tggtgaagctt ggagggtgtc cagatggcgt tgatgtgcgt ggaatcaaga 360  
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pctau2013000426-seq1

|                                                                    |      |
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| atgggactag agtgcggccc atgatcaaga cagacgataa ttctacgtca catgtcccaa  | 480  |
| gaacctttat caaccagttg ccggattgga gcatgcttct tgctgcaatc accacaatct  | 540  |
| tcttggctgc agagaaacaa tggatgatgc tggattggaa aaccaagcgg cctgacatgc  | 600  |
| ttgctgatct ggatcctttt ggtttaggga gaattgtgca ggatgggctt gtattccgtc  | 660  |
| aaaactttctc tattagatcc tatgaaatag gggctgatcg aactgcgtcg atagagacgc | 720  |
| taatgaatca tttgcaggaa actgccctta atcatgtaaa gactgcggga ctcttgggtg  | 780  |
| atggcttttg ctcaacacct gaaatgtgca agaagaatct attctgggtg gtgacaaaga  | 840  |
| tgcaggtgat ggtagaccgt tatccaactt ggggtgatgt tgttcaagta gatacatggg  | 900  |
| tagctcgatc tgggaaaaac ggcatgcgcc gtgattggct gcttcgtgat tgcaaaacag  | 960  |
| gcgaggctcgt aacaagagct tcaagtaatt gggttatgat gaataaagag acaaggaggt | 1020 |
| tatcaaaaat tccagatgaa gtccgagctg aaatagaaca gtactttgta gatgcacctc  | 1080 |
| cggctcgtgga tgatgacagc agaaaattgc ctaaacttga agacaccact gctgactatg | 1140 |
| ttcgcaatgg tttaactcca aggtggagtg atctggatgt caaccaacat gttaacaatg  | 1200 |
| tgaagtatat tggttggatc cttgagagtg ctccacaaca agttgtggag aagtatgagc  | 1260 |
| ttgctggctt gactctggaa taccgtcgag aatgtaggaa ggatagcgtg ctgagtcgct  | 1320 |
| gacatcggta ttgggtggca atggtgatgg aatagctgat tccgattcca gtgatgttga  | 1380 |
| ttgccagcat gtgctgctat ttgagagtgg tggatgaagg gaggttgtga aaggaaggac  | 1440 |
| tgcatggcga ccaaaaaaag ataaggatgg aattagaagc agcattgctg acttctttgc  | 1500 |
| tggaaatgga aatggaaatg gaagtgccta ataccatgtt tcatgttttg cccttttgcc  | 1560 |
| tcatttcaat gtgtataaaa gaatcatcat cactcatcct atttatgctg gctcttggaa  | 1620 |
| ataacttgca atgtcctgcc cccacatata tacatatattt tctattttgt a          | 1671 |

<210> 42

<211> 458

<212> DNA

<213> Carthamus tinctorius

<400> 42

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| atggtggata ctgctgctac tgcttcgctg tttccggttt cttctacaca atcggactct | 60 |
|-------------------------------------------------------------------|----|

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| ggtgctaaga actccggtaa gcatggaggt gggctgggaa gtgtggatgt gcgcgggatt | 120 |
|-------------------------------------------------------------------|-----|

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|                                                                    |     |
|--------------------------------------------------------------------|-----|
| aagacaaaat cttctgggag tttgcaagtt aagacacatg cgcaggcccc cgcaaagggtg | 180 |
| aatggttcta gaataggtgt catggatggc ctcaagatgg atgataattc gtcgtcggct  | 240 |
| gccccgagga cttttatcaa ccaattgcct gattggagca tgcttcttgc tgccatcacg  | 300 |
| actattttct tggctgctga gaagcaatgg atgatgctag agtggaagac taagcggccg  | 360 |
| gacatgcttt cggaaatgga tccttttggt ttagggagaa ttgtggagga tagtttcata  | 420 |
| tttcgtcaaa acttttctat taggtcgtat gaaatagg                          | 458 |

<210> 43  
 <211> 1086  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                               |     |
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| <400> 43<br>atggttgcta cggctgctac tgcatcactg tttccggttt cttctccaca acctcactct | 60  |
| gggaccaaga aatctggtaa gcttggaggt gtgccagatg gcgttgatgt gcgtggaatc             | 120 |
| aagacaaaat ctgttacttc tggcgggtttg caagttaagg ctgcacaggc tcctgcagag            | 180 |
| gtaaattggga ctagagtgcg gcccatgatac aagacagacg ataattctac gtcacatgtc           | 240 |
| ccaagaacct ttatcaacca gttgccgatg tggagcatgc ttcttgctgc aatcaccaca             | 300 |
| atcttcttgg ctgcagagaa acaatggatg atgctggatt ggaaaaccaa gcggcctgac             | 360 |
| atgcttgctg atctggatcc ttttggttta gggagaattg tgcaggatgg gcttgtattc             | 420 |
| cgtcaaaact tctctattag atcctatgaa ataggggctg atcgaactgc gtcgatagag             | 480 |
| acgctaataa atcatttgca ggaaactgcc cttaatcatg taaagactgc gggactcttg             | 540 |
| ggtgatggct ttggctcaac acctgaaatg tgcaagaaga atctattctg ggtggtgaca             | 600 |
| aagatgcagg tgatggtaga ccgttatcca acttgggggtg atgttggttca agtagataca           | 660 |
| tgggtagctc gatctgggaa aaacggcatg cgccgtgatt ggctgcttcg tgattgcaaa             | 720 |
| acaggcgagg tcgtaacaag agcttcaagt aattgggtta tgatgaataa agagacaagg             | 780 |
| aggttatcaa aaattccaga tgaagtccga gctgaaatag aacagtactt tgtagatgca             | 840 |
| cctccggtcg tggatgatga cagcagaaaa ttgcctaaac ttgaagacac cactgctgac             | 900 |
| tatgttcgca atggtttaac tccaagggtg agtgatctgg atgtcaacca acatgttaac             | 960 |

pctau2013000426-seq1

aatgtgaagt atattggttg gatccttgag agtgctccac aacaagttgt ggagaagtat 1020  
gagcttgctg gcttgactct ggaataccgt cgagaatgta ggaaggatag cgtgctgagt 1080  
cgctga 1086

<210> 44  
<211> 152  
<212> PRT  
<213> Carthamus tinctorius

<400> 44

Met Val Asp Thr Ala Ala Thr Ala Ser Leu Phe Pro Val Ser Ser Thr  
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Gln Ser Asp Ser Gly Ala Lys Asn Ser Gly Lys His Gly Gly Gly Leu  
20 25 30

Gly Ser Val Asp Val Arg Gly Ile Lys Thr Lys Ser Ser Gly Ser Leu  
35 40 45

Gln Val Lys Thr His Ala Gln Ala Pro Ala Lys Val Asn Gly Ser Arg  
50 55 60

Ile Gly Val Met Asp Gly Leu Lys Met Asp Asp Asn Ser Ser Ser Ala  
65 70 75 80

Ala Pro Arg Thr Phe Ile Asn Gln Leu Pro Asp Trp Ser Met Leu Leu  
85 90 95

Ala Ala Ile Thr Thr Ile Phe Leu Ala Ala Glu Lys Gln Trp Met Met  
100 105 110

Leu Glu Trp Lys Thr Lys Arg Pro Asp Met Leu Ser Glu Met Asp Pro  
115 120 125

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

Phe Ser Ile Arg Ser Tyr Glu Ile  
145 150

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<210> 45  
 <211> 361  
 <212> PRT  
 <213> Carthamus tinctorius

<400> 45

Met Val Ala Thr Ala Ala Thr Ala Ser Leu Phe Pro Val Ser Ser Pro  
 1 5 10 15

Gln Pro His Ser Gly Thr Lys Lys Ser Gly Lys Leu Gly Gly Val Pro  
 20 25 30

Asp Gly Val Asp Val Arg Gly Ile Lys Thr Lys Ser Val Thr Ser Gly  
 35 40 45

Gly Leu Gln Val Lys Ala Ala Gln Ala Pro Ala Glu Val Asn Gly Thr  
 50 55 60

Arg Val Arg Pro Met Ile Lys Thr Asp Asp Asn Ser Thr Ser His Val  
 65 70 75 80

Pro Arg Thr Phe Ile Asn Gln Leu Pro Asp Trp Ser Met Leu Leu Ala  
 85 90 95

Ala Ile Thr Thr Ile Phe Leu Ala Ala Glu Lys Gln Trp Met Met Leu  
 100 105 110

Asp Trp Lys Thr Lys Arg Pro Asp Met Leu Ala Asp Leu Asp Pro Phe  
 115 120 125

Gly Leu Gly Arg Ile Val Gln Asp Gly Leu Val Phe Arg Gln Asn Phe  
 130 135 140

Ser Ile Arg Ser Tyr Glu Ile Gly Ala Asp Arg Thr Ala Ser Ile Glu  
 145 150 155 160

Thr Leu Met Asn His Leu Gln Glu Thr Ala Leu Asn His Val Lys Thr  
 165 170 175

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Ala Gly Leu Leu Gly Asp Gly Phe Gly Ser Thr Pro Glu Met Cys Lys  
180 185 190

Lys Asn Leu Phe Trp Val Val Thr Lys Met Gln Val Met Val Asp Arg  
195 200 205

Tyr Pro Thr Trp Gly Asp Val Val Gln Val Asp Thr Trp Val Ala Arg  
210 215 220

Ser Gly Lys Asn Gly Met Arg Arg Asp Trp Leu Leu Arg Asp Cys Lys  
225 230 235 240

Thr Gly Glu Val Val Thr Arg Ala Ser Ser Asn Trp Val Met Met Asn  
245 250 255

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

Ile Glu Gln Tyr Phe Val Asp Ala Pro Pro Val Val Asp Asp Asp Ser  
275 280 285

Arg Lys Leu Pro Lys Leu Glu Asp Thr Thr Ala Asp Tyr Val Arg Asn  
290 295 300

Gly Leu Thr Pro Arg Trp Ser Asp Leu Asp Val Asn Gln His Val Asn  
305 310 315 320

Asn Val Lys Tyr Ile Gly Trp Ile Leu Glu Ser Ala Pro Gln Gln Val  
325 330 335

Val Glu Lys Tyr Glu Leu Ala Gly Leu Thr Leu Glu Tyr Arg Arg Glu  
340 345 350

Cys Arg Lys Asp Ser Val Leu Ser Arg  
355 360

<210> 46  
<211> 1545  
<212> DNA

&lt;213&gt; Carthamus tinctorius

&lt;400&gt; 46

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| acttattatc gtaaacccta ctgaatctct ctacaggggt ttgctgaatt tgctcctttt  | 120  |
| cttctccttc caatggcttg cagactcgca gattctagtt tccttttgaa ggggtcccaa  | 180  |
| caaaagccat tgcatgggta tagatttggg tcactctatc cagcaggcac atcttttttg  | 240  |
| aagtgggata ttctaccta atgtagaacc aaacatcaaa catatgtagt tcctttgaga   | 300  |
| aggactaaaa tagtacaagc agtgactagt tctgttacag caccattacc atcagacagt  | 360  |
| gcagaagaga ggaaagaatt atgtgaaagt tacggtttcc ggcaaattgg agaaccactc  | 420  |
| ccggacaata tcaccttgaa gaacattatc gatactcttc ccaaaactgt gtttgagatt  | 480  |
| gataacgtga aagcattgaa gtcgggtattg atatctgcaa cttcatatgc tttggggctt | 540  |
| ttcatgattg ccaaactctc atggtatctt cttccattgg cttgggcatg gacaggaact  | 600  |
| gcagttacag ggttctttgt aataggatcat gattgtgcac acaaactctt ctcaaagaac | 660  |
| aaactgggtg aagatattgt tggaactttg gccttcctgc cattgatata cccttatgag  | 720  |
| ccatggcggt tcaagcatga tcgacatcat gcaaaaacaa acatgttgga tgaagataca  | 780  |
| gcttggcacc ctgtaatgga aacacatttc aaggagaacc caattttcca gaaggcaatc  | 840  |
| atattcggat atggtcctat tcgccccatc atgtctatat cgcactgggt aatctggcat  | 900  |
| ttcaatttga ataaattcag accgaatgaa attggaagag taaagatcag tcttgcttgt  | 960  |
| gtttttgcat tcatggcaat tggatggccg ttaattgtct acaaggccgg gatagttgga  | 1020 |
| tggataaagt tttggttaat gccatggttg ggctatcatt tttggatgag cactttcaca  | 1080 |
| atggttcacc acacagcacc tcacgtacct ttcaaatttt cggacgagtg gaatgcagct  | 1140 |
| aaggcacaac ttagtggcac cgtgcactgt gattatcctc gctggataga gatcctttgt  | 1200 |
| catgatatca acgttcatat cccccacat gtctcctcaa agattccaag ttacaacttg   | 1260 |
| cgtgcagctc ataaatctct tcaagagaat tggggaaaat atatgaatga ggcctcatgg  | 1320 |
| aactggcgct taatgaagac gatcttgacg atttgccatg tctacgacaa agagcgtaat  | 1380 |
| tacatctcgt ttgaagagat tgctcccgag atatcccagc ccaatcgcac tacttagaag  | 1440 |
| ggtaatgccc gactatgctt aactcaatca tttgtttttt tatttacata tttcattaat  | 1500 |

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<210> 47

<211> 1305

<212> DNA

<213> Carthamus tinctorius

<400> 47

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ctacctaaat gtagaaccaa acatcaaaca tatgtagttc ctttgagaag gactaaaata 180

gtacaagcag tgactagttc tgttacagca ccattaccat cagacagtgc agaagagagg 240

aaagaattat gtgaaagtta cggtttccgg caaattggag aaccactccc ggacaatatc 300

accttgaaga acattatcga tactcttccc aaaactgtgt ttgagattga taacgtgaaa 360

gcattgaagt cggtattgat atctgcaact tcatatgctt tggggctttt catgattgcc 420

aaatctccat ggtatcttct tccattggct tgggcatgga caggaactgc agttacaggg 480

ttctttgtaa taggtcatga ttgtgcacac aaatctttct caaagaacaa actggtggaa 540

gatattgttg gaactttggc cttcctgcca ttgatatacc cttatgagcc atggcgtttc 600

aagcatgatc gacatcatgc aaaaacaaac atgttggatg aagatacagc ttggcaccct 660

gtaatggaaa cacatttcaa ggagaacca attttccaga aggcaatcat attcggatat 720

ggtcctattc gcccatcat gtctatatcg cactgggtaa tctggcattt caatttgaat 780

aaattcagac cgaatgaaat tggaagagta aagatcagtc ttgcttgtgt ttttgcattc 840

atggcaattg gatggccgtt aattgtctac aaggccggga tagttggatg gataaagttt 900

tggttaatgc catggttggg ctatcatttt tggatgagca ctttcacaat gggttcaccac 960

acagcacctc acgtaccttt caaatcttcg gacgagtgga atgcagctaa ggcacaactt 1020

agtggcaccg tgcactgtga ttatcctcgc tggatagaga tcctttgtca tgatatcaac 1080

gttcatatcc cccaccatgt ctctcaaag attccaagtt acaacttgcg tgcagctcat 1140

aaatctcttc aagagaattg gggaaaatat atgaatgagg cctcatggaa ctggcgctta 1200

atgaagacga tcttgacgat ttgccatgtc tacgacaaag agcgtaatta catctcgttt 1260

gaagagattg ctcccgagat atcccagccc aatcgcata cttag

1305

&lt;210&gt; 48

&lt;211&gt; 434

&lt;212&gt; PRT

&lt;213&gt; Carthamus tinctorius

&lt;400&gt; 48

Met Ala Cys Arg Leu Ala Asp Ser Ser Phe Leu Leu Lys Gly Pro Gln  
 1 5 10 15

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

Thr Ser Phe Leu Lys Trp Asp Ile Leu Pro Lys Cys Arg Thr Lys His  
 35 40 45

Gln Thr Tyr Val Val Pro Leu Arg Arg Thr Lys Ile Val Gln Ala Val  
 50 55 60

Thr Ser Ser Val Thr Ala Pro Leu Pro Ser Asp Ser Ala Glu Glu Arg  
 65 70 75 80

Lys Glu Leu Cys Glu Ser Tyr Gly Phe Arg Gln Ile Gly Glu Pro Leu  
 85 90 95

Pro Asp Asn Ile Thr Leu Lys Asn Ile Ile Asp Thr Leu Pro Lys Thr  
 100 105 110

Val Phe Glu Ile Asp Asn Val Lys Ala Leu Lys Ser Val Leu Ile Ser  
 115 120 125

Ala Thr Ser Tyr Ala Leu Gly Leu Phe Met Ile Ala Lys Ser Pro Trp  
 130 135 140

Tyr Leu Leu Pro Leu Ala Trp Ala Trp Thr Gly Thr Ala Val Thr Gly  
 145 150 155 160

Phe Phe Val Ile Gly His Asp Cys Ala His Lys Ser Phe Ser Lys Asn  
 165 170 175

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Lys Leu Val Glu Asp Ile Val Gly Thr Leu Ala Phe Leu Pro Leu Ile  
180 185 190

Tyr Pro Tyr Glu Pro Trp Arg Phe Lys His Asp Arg His His Ala Lys  
195 200 205

Thr Asn Met Leu Asp Glu Asp Thr Ala Trp His Pro Val Met Glu Thr  
210 215 220

His Phe Lys Glu Asn Pro Ile Phe Gln Lys Ala Ile Ile Phe Gly Tyr  
225 230 235 240

Gly Pro Ile Arg Pro Ile Met Ser Ile Ser His Trp Leu Ile Trp His  
245 250 255

Phe Asn Leu Asn Lys Phe Arg Pro Asn Glu Ile Gly Arg Val Lys Ile  
260 265 270

Ser Leu Ala Cys Val Phe Ala Phe Met Ala Ile Gly Trp Pro Leu Ile  
275 280 285

Val Tyr Lys Ala Gly Ile Val Gly Trp Ile Lys Phe Trp Leu Met Pro  
290 295 300

Trp Leu Gly Tyr His Phe Trp Met Ser Thr Phe Thr Met Val His His  
305 310 315 320

Thr Ala Pro His Val Pro Phe Lys Phe Ser Asp Glu Trp Asn Ala Ala  
325 330 335

Lys Ala Gln Leu Ser Gly Thr Val His Cys Asp Tyr Pro Arg Trp Ile  
340 345 350

Glu Ile Leu Cys His Asp Ile Asn Val His Ile Pro His His Val Ser  
355 360 365

Ser Lys Ile Pro Ser Tyr Asn Leu Arg Ala Ala His Lys Ser Leu Gln  
370 375 380

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Glu Asn Trp Gly Lys Tyr Met Asn Glu Ala Ser Trp Asn Trp Arg Leu  
385 390 395 400

Met Lys Thr Ile Leu Thr Ile Cys His Val Tyr Asp Lys Glu Arg Asn  
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Tyr Ile Ser Phe Glu Glu Ile Ala Pro Glu Ile Ser Gln Pro Asn Arg  
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ttctcgtgga aatacagcca ccgccgccac cactccaaca ccggctcgat tgagcacgac 120  
gaggtcttcg tcccgaact caaatccggg gtccgggtcca ccgcaaaata cctaaacaac 180  
ccccccggcc ggatcttgac ctttcttgtc accctcacc tcggctggcc gttgtacctc 240  
atgttcaacg tctccggccg ctactacgac cgctttgcct gccattttga cccaaacagc 300  
cccatctact cgaaccgtga acgtgcccag atcttcatct ccgacgccgg gatcttcgcc 360  
gtcctctacg ggctctaccg gctcgggcg gtcaaagggc tcgtgtgggt cctgaccgtc 420  
tatgccggac cgttgctcgt ggtcaacggg tttcttgctc tgatcacgtt cctccagcac 480  
accacccgt cgttgccga ctacgactca accgagtggg actggctccg tggggccctg 540  
gccaccatcg accgtgacta cgggatttta aacaaggtgt tccacaacat caccgacacc 600  
cacgtgacc accatctgtt ttcgacgat ccgcattatc acgcgatgga ggccacgaag 660  
gcgataattc cgatcctcgg ggattattat cagttcgatg ggacgtcagt ttttaaggcg 720  
atgtataggg agacgaagga gtgcatttat gtggat 756

<210> 50  
 <211> 300  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> RNAi vector construction

<400> 50  
 ctttatcaac cagttgccgg attggagcat gcttcttgct gcaatcacca caatcttctt 60  
 ggctgcagag aaacaatgga tgatgctgga ttggaaaacc aagcggcctg acatgcttgc 120  
 tgatctggat ccttttggtt tagggagaat tgtgcaggat gggcttgtat tccgtcaaaa 180  
 cttctctatt agatcctatg aaataggggc tgatcgaact gcgtcgatag agacgctaata 240  
 gaatcatttg caggaaactg cccttaatca tgtaaagact gcgggactct tgggtgatgg 300

<210> 51  
 <211> 290  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> RNAi vector construction

<400> 51  
 ccaaaactgt gtttgagatt gataacgtga aagcattgaa gtcggtattg atatctgcaa 60  
 cttcatatgc tttggggcctt ttcattgattg ccaaattctc atggtatctt cttccattgg 120  
 cttgggcatg gacaggaact gcagttacag ggttctttgt aataggtcat gattgtgcac 180  
 acaaattctt ctcaaagaac aaactggtgg aagatattgt tggaactttg gccttcctgc 240  
 cattgatata cccttatgag ccatggcggt tcaagcatga tcgacatcat 290

<210> 52  
 <211> 1200  
 <212> DNA  
 <213> Arabidopsis thaliana

<400> 52  
 tatgtagaac taaagactaa gggacagaga gttcgtctaa acaggtgaat ctagtcgttg 60  
 ttatctaata aacaattcag ccccaaattgc agaacacaca tagagctctc tattgattca 120

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|                                                                   |      |
|-------------------------------------------------------------------|------|
| aattacgatc tgatactgat aacgtctaga ttttttaggg taaagcaatc aatcacctga | 180  |
| cgattcaagg tggttggatc atgacgattc cagaaaacat caagcaagct ctcaaagcta | 240  |
| cactctttgg gatcatactg aactctaaca acctcgttat gtcccgtagt gccagtacag | 300  |
| acatcctcgt aactcggatt gtgcacgatg ccatggctat acccaacctc ggtcttggtc | 360  |
| acaccaggaa ctctctggta agctagctcc actccccaga aacaaccgcc gccaaattgc | 420  |
| gcgaattgct gacctgaaga cggaacatca tcgtcgggtc cttgggcatg tgcggcggaa | 480  |
| gatgggtcag cttgggcttg aggacgagac ccgaatccga gtctgttgaa aaggttggtc | 540  |
| attggggatt tgtatacgga gattggctcg cgagagggtt gagggaaagg acaaatgggt | 600  |
| ttggctctgg agaaagagag tgcggcttta gagagagaat tgagagggtt agagagagat | 660  |
| gcggcggcga tgagcggagg agagacgacg aggacctgca ttatcaaagc agtgacgtgg | 720  |
| tgaaatttgg aacttttaag aggcagatag atttattatt tgtatccatt ttcttcattg | 780  |
| ttctagaatg tcgcggaaca aattttaaaa ctaaatccta aatttttcta attttggtgc | 840  |
| caatagtgga tatgtgggcc gtatagaagg aatctattga aggcccaaac ccatactgac | 900  |
| gagcccaaag gttcgttttg cgttttatgt ttcggttcga tgccaacgcc acattctgag | 960  |
| ctaggcaaaa aacaaacgtg tctttgaata gactcctctc gttaacacat gcagcggctg | 1020 |
| catggtgacg ccattaacac gtggcctaca attgcatgat gtctccattg acacgtgact | 1080 |
| tctcgtctcc tttcttaata tatctaaca acactcctac ctcttccaaa atatatacac  | 1140 |
| atctttttga tcaatctctc attcaaaatc tcattctctc tagtaaaca gaacaaaaaa  | 1200 |

<210> 53

<211> 2033

<212> DNA

<213> Linum usitatissimum

<400> 53

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| ctcaagcata cggacaagg taaataacat agtcaccaga acataataaa caaaaagtgc  | 60  |
| agaagcaaga ctaaaaaaat tagctatgga cattcagggt catattggaa acatcattat | 120 |
| cctagtcttg tgaccatcct tcctcctgct ctagttgaga ggccttgga ctaacgagag  | 180 |
| gtcagttggg atagcagatc cttatcctgg actagccttt ctggtgtttc agagtcttcg | 240 |
| tgccgccgtc tacatctatc tccattaggt ctgaagatga ctcttcacac caacgacgtt | 300 |

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|                                                                    |      |
|--------------------------------------------------------------------|------|
| taaggtctct atcctactcc tagcttgcaa tacctggctt gcaataacctg gagcatcgtg | 360  |
| cacgatgatt ggatactgtg gaggaggagt gtttgctgat ttagagctcc cggttggggtg | 420  |
| atttgacttc gatttcagtt taggcttggt gaaatcccc aggttccatt gtgaagcctt   | 480  |
| tagagcttga gcttccttcc atgttaatgc cttgatcgaa tactcctaga gaaaaggga   | 540  |
| gtcgatctct gagtattgaa atcgaagtgc acatcccccc tcaacgtgtc caatcaatcc  | 600  |
| acaaacaaag cagaagacag gtaatctttc atacttatac tgacaagtaa tagtcttacc  | 660  |
| gtcatgcata ataacgtctc gttccttcaa gaggggtttt ccgacatcca taacgacccg  | 720  |
| aagcctcatg aaagcattag ggaagaactt ttggttcttc ttgtcatggc ctttataggt  | 780  |
| gtcagccgag ctgcgaatt cccgtccgac tggctccgca aaatattcga acggcaagtt   | 840  |
| atggacttgc aaccataact ccacggtatt gagcaggacc tattgtgaag actcatctca  | 900  |
| tggagcttca gaatgtggtt gtcagcaaac caatgaccga aatccatcac atgacggacg  | 960  |
| tccagtgggt gagcgaaacg aaacaggaag cgcctatctt tcagagtcgt gagctccaca  | 1020 |
| ccggattccg gcaactacgt gttgggcagg cttcgccgta ttagagatat gttgaggcag  | 1080 |
| acccatctgt gccactcgta caattacgag agttgttttt tttgtgattt tcctagtttc  | 1140 |
| tcgttgatgg tgagctcata ttctacatcg tatggctctt caacgtcgtt tcctgtcatc  | 1200 |
| tgatatcccg tcatttgcac ccacgtgcgc cgcctcccg gccaagtccc taggtgtcat   | 1260 |
| gcacgcaaaa ttgggtggtg tgccgggctgc cctgtgcttc ttaccgatgg gtggagggtg | 1320 |
| agtttggggg tctccgcggc gatggtagtg ggttgacggg ttggtgtggg ttgacggcat  | 1380 |
| tgatcaattt acttcttgct tcaaattctt tggcagaaaa caattcatta gattagaact  | 1440 |
| ggaaaccaga gtgatgagac ggattaagtc agattccaac agagttacat ctcttaagaa  | 1500 |
| ataatgtaac cccttagac tttatatatt tgcaattaaa aaaataattt aacttttaga   | 1560 |
| ctttatatat agttttaata actaagttta accactctat ttttatatc gaaactattt   | 1620 |
| gtatgtctcc cctctaaata aacttggtat tgtgtttaca gaacctataa tcaaataatc  | 1680 |
| aatactcaac tgaagtttgt gcagttaatt gaagggatta acggccaaaa tgcactagta  | 1740 |
| ttatcaaccg aatagattca cactagatgg ccatttccat caatatcatc gccgttcttc  | 1800 |
| ttctgtccac atatcccctc tgaaacttga gagacacctg cacttcattg tccttattac  | 1860 |

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|                                                                   |      |
|-------------------------------------------------------------------|------|
| gtgttacaaa atgaaaccca tgcattcatg caaactgaag aatggcgcaa gaacccttcc | 1920 |
| cctccatttc ttatgtggcg accatccatt tcaccatctc ccgctataaa acacccccat | 1980 |
| cacttcacct agaacatcat cactacttgc ttatccatcc aaaagatacc cac        | 2033 |

<210> 54  
 <211> 253  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Nos polyadenylation signal

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| <400> 54                                                           |     |
| gatcgttcaa acatttggca ataaagtttc ttaagattga atcctgttgc cggctttg    | 60  |
| atgattatca tataatttct gttgaattac gttaagcatg taataattaa catgtaatgc  | 120 |
| atgacgttat ttatgagatg gggtttttatg attagagtcc cgcaattata catttaatac | 180 |
| gcgatagaaa acaaaatata gcgcgcaaac taggataaat tatcgcgcgc ggtgtcatct  | 240 |
| atgttactag atc                                                     | 253 |

<210> 55  
 <211> 708  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Ocs polyadenylation signal

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| <400> 55                                                           |     |
| ctgctttaat gagatatgcg agacgcctat gatcgcgatga tttttgcttt caattctgtt | 60  |
| gtgcacgttg taaaaaacct gagcatgtgt agctcagatc cttaccgccg gtttcggttc  | 120 |
| attctaataga atatatcacc cgttactatc gtatttttat gaataatatt ctccgttcaa | 180 |
| tttactgatt gtaccctact acttatatgt acaatattaa aatgaaaaca atatattgtg  | 240 |
| ctgaataggt ttatagcgac atctatgata gagcgccaca ataacaaaca attgcgtttt  | 300 |
| attattacaa atccaatttt aaaaaaagcg gcagaaccgg tcaaacctaa aagactgatt  | 360 |
| acataaatct tattcaaatt tcaaaaggcc ccaggggcta gtatctacga cacaccgagc  | 420 |
| ggcgaactaa taacgttcac tgaagggaac tccggttccc cgccggcgcg catgggtgag  | 480 |

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|                                                                   |     |
|-------------------------------------------------------------------|-----|
| attccttgaa gttgagtatt ggccgtccgc tctaccgaaa gttacgggca ccattcaacc | 540 |
| cgggccagca cggcggccgg gtaaccgact tgctgccccg agaattatgc agcatttttt | 600 |
| tggtgtatgt gggcccaaaa tgaagtgcag gtcaaactt gacagtgcg acaaatcggt   | 660 |
| gggcgggtcc agggcgaatt ttgcgacaac atgtcgaggc tcagcagg              | 708 |

<210> 56  
 <211> 50  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                    |    |
|--------------------------------------------------------------------|----|
| <400> 56<br>tgtctttcaa cgtctccgga agaccctatg accgtttcgc ctgccactac | 50 |
|--------------------------------------------------------------------|----|

<210> 57  
 <211> 49  
 <212> DNA  
 <213> Carthamus tinctorius

|                                                                   |    |
|-------------------------------------------------------------------|----|
| <400> 57<br>tgtctttcaa cgtctctgga agacctacaa ccgtttcgcc tgccactat | 49 |
|-------------------------------------------------------------------|----|

<210> 58  
 <211> 25  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> oligonucleotide

|                                         |    |
|-----------------------------------------|----|
| <400> 58<br>cttcagcgag taccaatggc tcgac | 25 |
|-----------------------------------------|----|

<210> 59  
 <211> 22  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> oligonucleotide

|                                      |    |
|--------------------------------------|----|
| <400> 59<br>ggtttcatcg tccactcctt ga | 22 |
|--------------------------------------|----|

<210> 60  
<211> 25  
<212> DNA  
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<220>  
<223> oligionucleotide

<400> 60  
cttcagcgag taccaatggc tcgac

25

<210> 61  
<211> 22  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligionucleotide

<400> 61  
ggtttcatcg tccactcctt ga

22

<210> 62  
<211> 25  
<212> DNA  
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<220>  
<223> oligionucleotide

<400> 62  
atgacaccat tggcttcatc tgcca

25

<210> 63  
<211> 22  
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<220>  
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<400> 63  
ctttctgctc actccatact tc

22

<210> 64  
<211> 25  
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<220>  
<223> oligionucleotide

<400> 64  
agcgaatatc agtggcttga cgatg 25

<210> 65  
<211> 23  
<212> DNA  
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<220>  
<223> oligionucleotide

<400> 65  
actccgcttt cctcactccg tac 23

<210> 66  
<211> 26  
<212> DNA  
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<220>  
<223> oligionucleotide

<400> 66  
catgaatgtg gtcacatgc ctttag 26

<210> 67  
<211> 22  
<212> DNA  
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<220>  
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<400> 67  
cttcttcac cttcggttt gc 22

<210> 68  
<211> 26  
<212> DNA  
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<220>  
<223> oligionucleotide

<400> 68  
cgtggttgaa tgacaccatt ggttac 26

<210> 69  
<211> 23  
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<220>  
<223> oligionucleotide

<400> 69  
accttctaca caccggtatg cct 23

<210> 70  
<211> 27  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligionucleotide

<400> 70  
catggaagat aagccaccgt cgacatc 27

<210> 71  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligionucleotide

<400> 71  
aacacgggtt cgcttgagca cga 23

<210> 72  
<211> 22  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligionucleotide

<400> 72  
tgcatacccg caagcaaaac cg 22

<210> 73  
<211> 22  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligionucleotide

<400> 73  
ccatctctcg agagttcctt ac

22

<210> 74  
<211> 25  
<212> DNA  
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<400> 74  
atgtggtcac catgccttta gtgag

25

<210> 75  
<211> 23  
<212> DNA  
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<220>  
<223> oligonucleotide

<400> 75  
tggaatgggc ctccattccg ctc

23

<210> 76  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 76  
acctaacgac agtcatgaac aag

23

<210> 77  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 77  
gtgaggaaag cggagtggac aac 23

<210> 78  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 78  
tgaaagcaag atgggaggag g 21

<210> 79  
<211> 22  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 79  
tcacaacttt acttattctt gt 22

<210> 80  
<211> 20  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 80  
attgaacaat ggggtgcaggc 20

<210> 81  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 81  
 catcatcttc aaatcttatt c 21

<210> 82  
 <211> 19  
 <212> DNA  
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<220>  
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<400> 82  
 aatcagcagc agcacaagc 19

<210> 83  
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<220>  
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<400> 83  
 caaacatacc accaaatgct act 23

<210> 84  
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 <212> DNA  
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<220>  
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<400> 84  
 ctcagtaacc agcctcaaaa cttg 24

<210> 85  
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<400> 85  
 gcggattgat caaatacttg tg 22

<210> 86  
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 <212> DNA  
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<400> 86  
 atcacaggaa gctcaaagca tct 23

<210> 87  
 <211> 21  
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<220>  
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<400> 87  
 gtaggttatg taacaatcgt g 21

<210> 88  
 <211> 23  
 <212> DNA  
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<220>  
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<400> 88  
 tgaagacgtt aagatgggag ctg 23

<210> 89  
 <211> 21  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> oligonucleotide

<400> 89  
 gtaggttatg taacaatcgt g 21

<210> 90  
 <211> 23  
 <212> DNA  
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<220>  
<223> oligonucleotide

<400> 90  
cagatccaac acttcaccac cag 23

<210> 91  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
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<400> 91  
agatctaaag aatttccatg gtg 23

<210> 92  
<211> 25  
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<220>  
<223> oligonucleotide

<400> 92  
ctgctctcta cgacactaaa ttcac 25

<210> 93  
<211> 24  
<212> DNA  
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<220>  
<223> oligonucleotide

<400> 93  
tctatctaag gagtatcaag gaac 24

<210> 94  
<211> 26  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> oligonucleotide

<400> 94  
 ctgaattcac acccacagat agctag 26

<210> 95  
 <211> 23  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> oligonucleotide

<400> 95  
 acatccccttc ttagctttaa cta 23

<210> 96  
 <211> 21  
 <212> DNA  
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<220>  
 <223> oligonucleotide

<400> 96  
 acttcgccct ctgttatctg g 21

<210> 97  
 <211> 24  
 <212> DNA  
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<220>  
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<400> 97  
 ccatacacat acatcctaca cgat 24

<210> 98  
 <211> 24  
 <212> DNA  
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<220>  
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<400> 98  
 actcacaata acttcatctc tctc 24

<210> 99  
 <211> 23  
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<400> 99  
 ctactagcca tacaatgtct tcg 23

<210> 100  
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<220>  
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<400> 100  
 gagattttca gagagcaagc gctt 24

<210> 101  
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 <212> DNA  
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<220>  
 <223> oligonucleotide

<400> 101  
 ctttggtctc ggaggcagac ata 23

<210> 102  
 <211> 24  
 <212> DNA  
 <213> Artificial Sequence

<220>  
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<400> 102  
 caaaaggagt ttcagaaagc ctcc 24

<210> 103  
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<220>  
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<400> 103  
actcgttgga tgccttcgag ttc 23

<210> 104  
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<212> DNA  
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<220>  
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<400> 104  
aatcagcagc agcacaagc 19

<210> 105  
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<220>  
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<400> 105  
aaggcggatga caattatgat atc 23

<210> 106  
<211> 24  
<212> DNA  
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<220>  
<223> oligonucleotide

<400> 106  
ctcagtaacc agcctcaaaa ctg 24

<210> 107  
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<220>  
<223> oligonucleotide

<400> 107  
 aaggcggaga cgattatgat atc 23

<210> 108  
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<400> 108  
 atcacaggaa gctcaaagca tct 23

<210> 109  
 <211> 22  
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<220>  
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<400> 109  
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<210> 110  
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<400> 110  
 cagatccaac acttcaccac cag 23

<210> 111  
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<400> 111  
 ctaaagaatt tccatggtgt tac 23

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 acttcgccct ctgttatctg g 21

<210> 113  
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 <223> oligonucleotide  
  
 <400> 113  
 gagagacggg ggaagtaggt g 21

<210> 114  
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 ctcacaataa cttcatctct ctc 23

<210> 115  
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 <400> 115  
 aaagacatag gcaacaacga gatc 24

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 <210> 117  
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 <400> 117  
 gcaaggtagt agaggacgaa g 21  
  
 <210> 118  
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pctau2013000426-seq1

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| atttcagtcg gtttttctcc tgtaaatttg tgtatctatc tgtgttgcat gtaattttgt   | 240  |
| ttcctttaga ttatagaaat gaaaatccat aatttttaggg ctgcttgtct tgtttggatt  | 300  |
| tgtgttatta ggttttgatc acagtaactt ccgtacgttt aatatgttaa atgctaaaca   | 360  |
| aaatgattta ttttttatat ttatggcttc tcgggtggcgc gatttgtgtt ttttaattcct | 420  |
| gaagtttctg tataacaatga tttcgaattt tggcgattag gcatctcttt actttggaag  | 480  |
| gaatttcaga ttttcttaat ctcatagaga agtgctgatt gggaatttgc ttaaagatat   | 540  |
| aagcactttt cagttcattg attgtttgat ggacatcaga tggttttttt gctgatgcc    | 600  |
| tgatgtctat tgtgttgaat gtatcttcaa taagtgcctt caatatgtat agcaaaactg   | 660  |
| agctaaggct gtgtttggca aactacctga taagctatat gttgactgat aagctagttt   | 720  |
| gtgaataaat tatgtttggc aaaaactagc atatgagtat gtaaaatgac taaaaagggt   | 780  |
| atcttgggggt ataatagtta atattgataa ggatagaatt ggagaaggct acaaaaagcc  | 840  |
| cttgaaatgc tactccaact agtgtttcaa taagctggct tatggctctat ccaaacatgt  | 900  |
| actagattat catctagctt atttttgcc aacacagcct aaatgtttga tggtcgatgg    | 960  |
| ctggcacttg acaatttgac atcattataa ctgaaacaat aatattcacc ttacataac    | 1020 |
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| tttagctgca ttgttggttg atgaatagat ctgtagatta cggtcctctg cgctttcagt | 180 |

pctau2013000426-seq1

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| tttggaattg tgttattagg ttttaattac agtaacttcc gtacgtttaa tatgtcaaat   | 360  |
| gctaaacaaa atgatttggt ttttatattt atggcttctc ggtggtcgga tttgtgtttt   | 420  |
| taattcctga agtttctgta tacaatgatt tcgaattttg gcgattaggc atctctttac   | 480  |
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| atggacatca aaatggattt tttgctgatg tctactgtgt tgaatgtacc ttcaataagg   | 660  |
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| ataattaata ttaataaggg tataattgga agagcctact aaaagctcct agaacgctac   | 840  |
| tccaactaac gtttcaataa gcttaactta tgggtccatcc aaacatgtac tagcttataa  | 900  |
| gcgagcttat ttttgccaaa cacagccaaa gtactttcat gggtgatatc cttgtatccc   | 960  |
| caactgagct aaatgggtccg atgggtcgacg agttgacatc attataatta tatatTTTTg | 1020 |
| aatccttaag gctaacgttt ccttagtttt tatttatggt gtgatgggtg cattacataa   | 1080 |
| tattcacctt tagctaaaaa ctagatgttc acctacgaac tgatccatat ggaacatttt   | 1140 |
| gcag                                                                | 1144 |