

SEQUENCE LISTING

<110> BASF Plant Science GmbH
 Wiig, Aaron

<120> COMPOSITIONS AND METHODS USING RNA INTERFERENCE OF CAD-LIKE GENES
 FOR CONTROL OF NEMATODES

<130> PF 58860

<160> 26

<170> PatentIn version 3.4

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 <213> Glycine max

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Thr Tyr Ile Asn Ser Cys Arg Asp Cys Glu Tyr Cys Asn Asp Gly Gln
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Glu Val His Cys Thr Lys Gly Ser Val Tyr Thr Phe Asn Gly Val Asp
65 70 75 80

Phe Asp Gly Thr Ile Thr Lys Gly Gly Tyr Ser Ser Tyr Ile Val Val
85 90 95

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

Gly Gly Leu Gly His Met Ala Val Lys Phe Gly Lys Ala Phe Gly Leu
145 150 155 160

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

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

Met Thr Ala Leu Ala Lys Ser Leu Asp Phe Ile Ile Asp Thr Ala Ser
195 200 205

Gly Asp His Ser Phe Asp Pro Tyr Met Ser Leu Leu Lys Thr Tyr Gly
210 215 220

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

Ser Leu Asn Ile Gly Ser Lys Thr Val Ala Gly Ser Val Thr Gly Gly
245 250 255

Thr Lys Asp Ile Gln Glu Met Ile Gly Phe Cys Ala Ala Asn Glu Ile
260 265 270

His Pro Asn Ile Glu Val Ile Pro Ile Glu Tyr Ala Asn Glu Ala Leu
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Glu Asn Ser Leu Lys Glu Lys
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          20          25          30
```

```
Gly Asn Glu Asp Val His Ile Lys Ile Thr His Cys Gly Val Cys Phe
          35          40          45
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Ala Asp Val Val Trp Thr Arg Asn Lys His Gly Asp Ser Lys Tyr Pro
          50          55          60
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Val Val Pro Gly His Glu Ile Ala Gly Ile Val Thr Lys Val Gly Ala
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Asn Val His His Phe Lys Val Gly Asp His Val Gly Val Gly Thr Tyr
          85          90          95
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Ile Asn Ser Cys Arg Asp Cys Glu Tyr Cys Asn Asp Gly Gln Glu Val
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His Cys Thr Lys Gly Ser Val Tyr Thr Phe Asn Gly Val Asp Phe Asp
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Gly Thr Ile Thr Lys Gly Gly Tyr Ser Ser Tyr Ile Val Val His Glu
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Arg Tyr Cys Phe Met Ile Pro Lys Ser Tyr Pro Leu Ala Ser Ala Ala
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Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Ser Pro Met Val Arg His
165 170 175

Lys Met Asn Gln Pro Gly Lys Ser Leu Gly Val Ile Gly Leu Gly Gly
180 185 190

Leu Gly His Met Ala Val Lys Phe Gly Lys Ala Phe Gly Leu Ser Val
195 200 205

Thr Val Phe Ser Thr Ser Ile Ser Lys Lys Glu Glu Ala Leu Ser Leu
210 215 220

Leu Gly Ala Asp Lys Phe Val Val Ser Ser Asn Gln Glu Glu Met Thr
225 230 235 240

Ala Leu Ala Lys Ser Leu Asp Phe Ile Ile Asp Thr Ala Ser Gly Asp
245 250 255

His Ser Phe Asp Pro Tyr Met Ser Leu Leu Lys Thr Tyr Gly Val Phe
260 265 270

Val Leu Val Gly Phe Pro Ser Gln Val Lys Phe Ile Pro Ala Ser Leu
275 280 285

Asn Ile Gly Ser Lys Thr Val Ala Gly Ser Val Thr Gly Gly Thr Lys
290 295 300

Asp Ile Gln Glu Met Ile Gly Phe Cys Ala Ala Asn Glu Ile His Pro
305 310 315 320

Asn Ile Glu Val Ile Pro Ile Glu Tyr Ala Asn Glu Ala Leu Glu Arg
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Ser Leu Lys Glu Lys
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<213> Vitis vinifera

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Gly Ser Asp Asp Val Ser Leu Asn Ile Thr His Cys Gly Val Cys Tyr
35 40 45

Ala Asp Val Val Trp Thr Arg Asn Lys Phe Gly Asp Ser Lys Tyr Pro
50 55 60

Val Val Pro Gly His Glu Ile Ala Gly Ile Val Lys Glu Val Gly Ser
65 70 75 80

Asn Val Arg Arg Phe Lys Val Gly Asp His Val Gly Val Gly Thr Tyr
85 90 95

Val Asn Ser Cys Arg Asp Cys Glu Tyr Cys Asn Asp Gly Leu Glu Val
100 105 110

His Cys Ala Arg Gly Ser Val Phe Thr Phe Asn Gly Val Asp Val Asp
115 120 125

Gly Thr Val Thr Lys Gly Gly Tyr Ser Ser His Ile Val Val His Glu
130 135 140

Arg Tyr Cys Phe Lys Ile Pro Asp Asn Tyr Pro Leu Ala Ser Ala Ala
145 150 155 160

Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Thr Pro Met Met Arg His
165 170 175

Lys Met Asn Gln Pro Gly Lys Ser Leu Gly Val Ile Gly Leu Gly Gly
180 185 190

Leu Gly His Leu Ala Val Lys Phe Gly Lys Ala Phe Gly Leu Arg Val
195 200 205

Thr Val Leu Ser Thr Ser Ile Ser Lys Lys Glu Glu Ala Leu Asn Leu
210 215 220

Leu Gly Ala Asp Lys Phe Val Val Ser Ser Asp Glu Gln Gln Met Met
225 230 235 240

Ala Leu Ser Arg Ser Leu Asp Phe Ile Ile Asp Thr Ala Ser Gly Asp
245 250 255

His Pro Phe Asp Pro Tyr Leu Ser Leu Leu Lys Thr Ala Gly Val Leu
260 265 270

Val Leu Val Gly Phe Pro Ser Glu Val Lys Phe Ser Pro Gly Ser Ile
275 280 285

Val Met Gly Met Arg Thr Val Ser Gly Ser Ala Thr Gly Gly Thr Lys

290

295

300

Asp Thr Gln Glu Met Leu Asp Phe Cys Ala Ala His Gly Ile His Pro
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Glu Ile Glu Val Ile Pro Ile Gln Tyr Ala Asn Glu Ala Leu Glu Arg
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Leu Ile Lys Lys Asp Val Lys Tyr Arg Phe Val Ile Asp Ile Glu Asn
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Ser Leu Lys
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<212> DNA

<213> Arabidopsis thaliana

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Val Thr Thr Asp Asp Val Ser Leu Thr Ile Thr His Cys Gly Val Cys
35 40 45

Tyr Ala Asp Val Ile Trp Ser Arg Asn Gln His Gly Asp Ser Lys Tyr
50 55 60

Pro Leu Val Pro Gly His Glu Ile Ala Gly Ile Val Thr Lys Val Gly
65 70 75 80

Pro Asn Val Gln Arg Phe Lys Val Gly Asp His Val Gly Val Gly Thr
85 90 95

Tyr Val Asn Ser Cys Arg Glu Cys Glu Tyr Cys Asn Glu Gly Gln Glu
100 105 110

Val Asn Cys Ala Lys Gly Val Phe Thr Phe Asn Gly Ile Asp His Asp
115 120 125

Gly Ser Val Thr Lys Gly Gly Tyr Ser Ser His Ile Val Val His Glu
130 135 140

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

Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Ala Pro Met Met Arg His
165 170 175

Asn Met Asn Gln Pro Gly Lys Ser Leu Gly Val Ile Gly Leu Gly Gly
180 185 190

Leu Gly His Met Ala Val Lys Phe Gly Lys Ala Phe Gly Leu Ser Val
195 200 205

Thr Val Phe Ser Thr Ser Ile Ser Lys Lys Glu Glu Ala Leu Asn Leu

210

215

220

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

Ala Leu Glu Lys Ser Leu Asp Phe Leu Val Asp Thr Ala Ser Gly Asp
245 250 255

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

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

Asn Leu Gly Met Arg Met Leu Ala Gly Ser Val Thr Gly Gly Thr Lys
290 295 300

Ile Thr Gln Gln Met Leu Asp Phe Cys Ala Ala His Lys Ile Tyr Pro
305 310 315 320

Asn Ile Glu Val Ile Pro Ile Gln Lys Ile Asn Glu Ala Leu Glu Arg
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Val Val Lys Lys Asp Ile Lys Tyr Arg Phe Val Ile Asp Ile Lys Asn
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Ser Leu Lys
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Pro Gly Leu Asp Asp Ile Ser Leu Lys Ile Thr His Cys Gly Val Cys
35 40 45

Tyr Ala Asp Val Val Trp Thr Arg Asn Lys His Gly Asp Ser Lys Tyr
50 55 60

Pro Leu Val Pro Gly His Glu Ile Val Gly Ile Val Lys Glu Val Gly
65 70 75 80

Ile Asn Val Val Ser Phe Lys Ala Gly Asp His Val Gly Val Gly Thr
85 90 95

Tyr Val Ser Ser Cys Gln Gln Cys Glu Tyr Cys Asn Glu Arg Met Glu
100 105 110

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

Asp Gly Thr Val Thr Lys Gly Gly Tyr Ser Ser His Ile Val Val His

130

135

140

Gln Arg Tyr Cys Phe Lys Ile Pro Asp Asn Leu Pro Leu Ala Ser Ala
145 150 155 160

Ala Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Ser Pro Met Ile Arg
165 170 175

His His Met Asn His Ala Gly Lys Ser Leu Gly Val Ile Gly Leu Gly
180 185 190

Gly Leu Gly His Met Ala Val Lys Phe Gly Lys Ala Phe Gly Leu Asn
195 200 205

Val Thr Ile Phe Ser Thr Ser Ala Ser Lys Lys Asp Glu Ala Leu Asn
210 215 220

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

Glu Ala Ser Ser Lys Thr Leu Asp Phe Ile Ile Asp Thr Ala Ser Gly
245 250 255

Asp His Pro Ile Asp Leu Tyr Met Pro Leu Leu Lys Thr Ala Gly Val
260 265 270

Phe Val Ile Val Gly Phe Pro Ser Glu Ile Lys Ile His Pro Ala Asn
275 280 285

Leu Ile Ile Gly Met Lys Ser Ile Ala Gly Ser Val Thr Gly Gly Thr
290 295 300

Lys Asp Thr Gln Glu Met Leu Asp Phe Cys Ala Lys Glu Arg Val Tyr
305 310 315 320

Pro Asp Ile Glu Val Ile Pro Ile Gln Tyr Val Asn Glu Ala Leu Glu
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Arg Met Ile Asn Lys Asp Val Lys Tyr Arg Phe Val Ile Asp Ile Glu
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Asn Ser Leu Val
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<213> Oryza sativa

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cggagcttag ctggtagtgt aacagggggg acaaaggata tccaggagat gataaacttc 900
tgtgctgcaa acaatgttta ccagatata gagatgatca agatagacta cgtcaacgag 960
gctcttcaga ggctcatcaa ccgggatgtg agattccgct ttgtaatcga catcgagaac 1020
tctttcaagt ag 1032

<210> 15
<211> 343
<212> PRT
<213> Oryza sativa

<400> 15
Met Ala Ala Glu Cys Gly Ser Gly Asn Cys Asp Ala Trp Ala Ala Arg
1 5 10 15
Asp Pro Ser Gly Ile Leu Ser Pro Tyr Lys Phe Asn Arg Arg Glu Val
20 25 30
Gln Ser Glu Asp Val Ser Leu Arg Ile Thr His Cys Gly Val Cys Tyr
35 40 45
Ala Asp Val Ile Trp Thr Arg Asn Met Phe Asn Asp Ser Ile Tyr Pro

50

55

60

Leu Val Pro Gly His Glu Ile Ala Gly Val Val Thr Glu Val Gly Ala
65 70 75 80

Asp Val Lys Gly Phe Lys Val Gly Asp His Asp Cys Glu Asn Cys Asn
85 90 95

Ser Ser Leu Glu Asn His Cys Ser Lys Cys Val Val Thr Tyr Asn Ser
100 105 110

Val Asp Ser Asp Gly Thr Val Thr Lys Gly Gly Tyr Ser Ser His Ile
115 120 125

Leu Val His Gln Arg Tyr Cys Phe Lys Ile Pro Ala Asp Tyr Pro Leu
130 135 140

Ser Lys Ala Ala Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Thr Pro
145 150 155 160

Met Ile Arg His Asn Met Asn Gln Pro Gly Lys Ser Leu Gly Val Ile
165 170 175

Gly Leu Gly Gly Leu Gly His Met Ala Val Lys Phe Gly Lys Ala Phe
180 185 190

Gly Leu Lys Val Thr Val Phe Ser Thr Ser Glu Ser Lys Arg Glu Glu
195 200 205

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

Asn Gln Met Glu Ser Leu Lys Ser Ser Leu His Phe Ile Ile Asp Thr
225 230 235 240

Ala Ser Gly Asp His Gln Phe Asp Pro Tyr Leu Ser Leu Leu Lys Val
245 250 255

Gly Gly Val Met Val Leu Leu Ser Phe Pro Ser Glu Ile Lys Val His
260 265 270

Pro Glu Asn Leu Asn Leu Ala Ala Arg Ser Leu Ala Gly Ser Val Thr
275 280 285

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

Asn Val Tyr Pro Asp Ile Glu Met Ile Lys Ile Asp Tyr Val Asn Glu
305 310 315 320

Ala Leu Gln Arg Leu Ile Asn Arg Asp Val Arg Phe Arg Phe Val Ile
325 330 335

Asp Ile Glu Asn Ser Phe Lys
340

<210> 16
<211> 894
<212> DNA
<213> *Oryza sativa*

<400> 16
atgaaattgt gtctaaatth caatatgagt aggcattgaga tagcaggagt tgtaactgag 60
gttggtgcag acgtcaagag cttcaaagtg ggtgaccatg taggtgattg cacatacgtg 120
aattcatgcc gggactgtga gaactgcaat agctctctag agaactactg ctcaacaat 180
gtctttcactt tcaatggtgt tgacactgat gggactgtca caaaggagg atattctact 240
cacatagtag tacatgagag gtattgcttt aaaatacctg atggctacc tttgaaaag 300
gcagcacctt tactttgtgc tggcatcact gtatatagtc cgatgatgag gcataaatg 360
aaccagccag ggaagtcact cggcgtcatt ggacttggtg gcttgggtca catggcagta 420
aaatttggga aagcctttgg actgaaagtc acagttatta gtactagtga atcaaagaga 480
aaagaagcta ttgaccttct tgggtcagat aatttcgtgg tgcattcggg tgaatatcag 540
atggagacct tgaaaagctc tctgaacttc attattgaca cagcctccgg cgatcaccca 600
ttcgatcctt atctcagct tctgaaagtt ggtggtgtaa tggcactact tagcttcca 660
agtgaaatca aagtgcattc tgcaaacctt aatctcgggtg ggcggagttt atctggtagt 720
gtaactggag gtacgaagga catccaggag atgataaact tctgtgcggc aaacaaaatc 780
taccagata tcgagatgat caagatagat tacatcaacg aggccttca gaggcttgtt 840
gaccgggatg tcagatttcg ctttgaatc gacattgaga actcgttcaa gtag 894

<210> 17
<211> 297
<212> PRT
<213> *Oryza sativa*

<400> 17

Met Lys Leu Cys Leu Asn Phe Asn Met Ser Arg His Glu Ile Ala Gly
1 5 10 15

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

His Val Gly Val Gly Thr Tyr Val Asn Ser Cys Arg Asp Cys Glu Asn
35 40 45

Cys Asn Ser Ser Leu Glu Asn Tyr Cys Ser Gln His Val Phe Thr Phe
50 55 60

Asn Gly Val Asp Thr Asp Gly Thr Val Thr Lys Gly Gly Tyr Ser Thr
65 70 75 80

His Ile Val Val His Glu Arg Tyr Cys Phe Lys Ile Pro Asp Gly Tyr
85 90 95

Pro Leu Glu Lys Ala Ala Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr
100 105 110

Ser Pro Met Met Arg His Asn Met Asn Gln Pro Gly Lys Ser Leu Gly
115 120 125

Val Ile Gly Leu Gly Gly Leu Gly His Met Ala Val Lys Phe Gly Lys
130 135 140

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

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

Asp Glu Asn Gln Met Glu Thr Leu Lys Ser Ser Leu Asn Phe Ile Ile
180 185 190

Asp Thr Ala Ser Gly Asp His Pro Phe Asp Pro Tyr Leu Thr Leu Leu
195 200 205

Lys Val Gly Gly Val Met Ala Leu Leu Ser Phe Pro Ser Glu Ile Lys
210 215 220

Val His Pro Ala Asn Leu Asn Leu Gly Gly Arg Ser Leu Ser Gly Ser
225 230 235 240

Val Thr Gly Gly Thr Lys Asp Ile Gln Glu Met Ile Asn Phe Cys Ala
245 250 255

Ala Asn Lys Ile Tyr Pro Asp Ile Glu Met Ile Lys Ile Asp Tyr Ile
260 265 270

Asn Glu Ala Leu Gln Arg Leu Val Asp Arg Asp Val Arg Phe Arg Phe
275 280 285

Val Ile Asp Ile Glu Asn Ser Phe Lys
290 295

<210> 18
<211> 1089
<212> DNA
<213> Populus trichocarpa

<400> 18
atggcaaat caccagaagt agaacatcca cataaggctt ttggctgggc tgccaaagat 60
agttctgggg tcctttctcc ctttcatttc tcaagaagg acaatggagt tgaagatgtg 120
accataaaaa tcctgtactg tggagtttgc cattcggact tgcacgctgc caagaatgaa 180
tggggggttt ccagatatcc tttgattcct gggcatgaaa ttgttggtat tgtgacaaaa 240
attggaagca atgtgaagaa gttcaaagt gacgatcagg ttggtggttg agtactggtg 300
aactcctgta agtcatgcga gtattgcgac caggacttgg agaattactg ccctaaaatg 360
atatttacat acaatgccca aaacatgat gggacaaaaa cttatggtgg ttattctgat 420
acaattgtgg ttgaccagca ctttgtactc cgtattcctg atagcatgcc tgctgatggg 480
gctgcaccac tattatgtgc tgggatcaca gtgtacagcc caatgaaata ttatggaatg 540
acagaaccag ggaagcattt ggaatcgta ggattggggg ggcttggaaca tgttgctgtg 600
aagattggtg aggcctttgg tttgaaagtt acagtcatca gttcatcatc aagaaaggag 660
agcgaagcac ttgatagact tgggtctgat tcattccttg tgagcagtga ccctgagaaa 720
atgaaggcag catttggcac tatggattac atcattgaca ctgtgtctgc agttcatgcc 780
ttggctccac ttcttagtct gctgaagaca aatggaaaac ttgttacttt gggcttgccct 840
gagaagcccc ttgagctgcc tatcttcctt ttggtcttgg ggcgaaagct agttggtgga 900
agtgatattg gaggggtgaa agagactcaa gagatggttg acttctgtgc gaagcacaat 960
attacctcag atgttgaggt gatccgaatg gatcaaatca acacagccat ggataggcct 1020
gccaaatcgg atgtcaggta ccggtttgtg attgatgtgg ccaactccct gtcacaatct 1080
cagttatga 1089

<210> 19
<211> 362
<212> PRT
<213> Populus trichocarpa

<400> 19

Met Ala Lys Ser Pro Glu Val Glu His Pro His Lys Ala Phe Gly Trp
1 5 10 15

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

Arg Asp Asn Gly Val Glu Asp Val Thr Ile Lys Ile Leu Tyr Cys Gly
35 40 45

Val Cys His Ser Asp Leu His Ala Ala Lys Asn Glu Trp Gly Phe Ser
50 55 60

Arg Tyr Pro Leu Ile Pro Gly His Glu Ile Val Gly Ile Val Thr Lys
65 70 75 80

Ile Gly Ser Asn Val Lys Lys Phe Lys Val Asp Asp Gln Val Gly Val
85 90 95

Gly Val Leu Val Asn Ser Cys Lys Ser Cys Glu Tyr Cys Asp Gln Asp
100 105 110

Leu Glu Asn Tyr Cys Pro Lys Met Ile Phe Thr Tyr Asn Ala Gln Asn
115 120 125

His Asp Gly Thr Lys Thr Tyr Gly Gly Tyr Ser Asp Thr Ile Val Val
130 135 140

Asp Gln His Phe Val Leu Arg Ile Pro Asp Ser Met Pro Ala Asp Gly
145 150 155 160

Ala Ala Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Ser Pro Met Lys
165 170 175

Tyr Tyr Gly Met Thr Glu Pro Gly Lys His Leu Gly Ile Val Gly Leu
180 185 190

Gly Gly Leu Gly His Val Ala Val Lys Ile Gly Lys Ala Phe Gly Leu
195 200 205

Lys Val Thr Val Ile Ser Ser Ser Ser Arg Lys Glu Ser Glu Ala Leu
210 215 220

Asp Arg Leu Gly Ala Asp Ser Phe Leu Val Ser Ser Asp Pro Glu Lys
225 230 235 240

Met Lys Ala Ala Phe Gly Thr Met Asp Tyr Ile Ile Asp Thr Val Ser
245 250 255

Ala Val His Ala Leu Ala Pro Leu Leu Ser Leu Leu Lys Thr Asn Gly
260 265 270

Lys Leu Val Thr Leu Gly Leu Pro Glu Lys Pro Leu Glu Leu Pro Ile
275 280 285

Phe Pro Leu Val Leu Gly Arg Lys Leu Val Gly Gly Ser Asp Ile Gly
290 295 300

Gly Val Lys Glu Thr Gln Glu Met Leu Asp Phe Cys Ala Lys His Asn
305 310 315 320

Ile Thr Ser Asp Val Glu Val Ile Arg Met Asp Gln Ile Asn Thr Ala
325 330 335

Met Asp Arg Leu Ala Lys Ser Asp Val Arg Tyr Arg Phe Val Ile Asp
340 345 350

Val Ala Asn Ser Leu Ser Gln Ser Gln Leu
355 360

<210> 20
<211> 1080
<212> DNA
<213> Nicotiana tabacum

<400> 20
atggcaaaat tatatgagaa tgaacaccca gtaaaggcct ttggatgggc agctagagat 60
acttctggtg ttctttctcc ttttaacttt tcaagaagag ccacgggtga aaaggatgtg 120
cagtttaaag ttatgtattg tggaaattgt cattctgatc ttcatcagct caagaatgaa 180
tggagcacta gcatatatcc aatggtacct gggcatgagg ttgctggtgt ggtaactgat 240
gttggtagca aggttgagaa atttaaggtt ggtgacaaag taggagttgg atgtttggtg 300
ggatcatgtc gcaaatgtga aaactgtgac aataatctcg agaattactg tcccggtcag 360
ataatgacat acaacggtat ttacatcgat ggaaccacca cgtatggagg atactccaat 420
attatggtaa cggacgagca ctacgtggtt cactggcctg agaacttgcc aatggaagcg 480
gctccattgt tatgtgctgg aattacaaca tatagtcctt tgaatatattt tggactcgat 540
aaacctgaa tgcacattgg tgttgttggc cttggtggtc ttggtcatat ggctgtgaaa 600
tttgctaagg cattcggaac aaaagtgact gttattagta catctgctag taagaacaaa 660

gaagcaattg ggcgtttggg tgcggactca tttttgggta gtcgtgaccc tgaccaaag 720
caggctgcag caggctcgct tgatggcatc attgacactg tctctgcaat tcacctctt 780
cttcattga ttaatttggt gaaaactcat gggagcttg taatggttg cgcaccagaa 840
aaaccattag agttgcccgt atttcccttg cttttaggaa ggaagctagt agcagggagt 900
gccataggag ggataaagga gacacaagag atggttagatt tcgcgcaaaa gcataacatt 960
acaccagatg ttgaagtcgt gccaatggac tatgtgaata cagctttaga ccgtcttttg 1020
aaatcggatg ttaagtaccg tttgtactt gacgttgca atacattaaa caagaattag 1080

<210> 21
<211> 359
<212> PRT
<213> Nicotiana tabacum
<400> 21

Met Ala Lys Leu Tyr Glu Asn Glu His Pro Val Lys Ala Phe Gly Trp
1 5 10 15

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

Arg Ala Thr Gly Glu Lys Asp Val Gln Phe Lys Val Met Tyr Cys Gly
35 40 45

Ile Cys His Ser Asp Leu His Gln Leu Lys Asn Glu Trp Ser Thr Ser
50 55 60

Ile Tyr Pro Met Val Pro Gly His Glu Val Ala Gly Val Val Thr Asp
65 70 75 80

Val Gly Ser Lys Val Glu Lys Phe Lys Val Gly Asp Lys Val Gly Val
85 90 95

Gly Cys Leu Val Gly Ser Cys Arg Lys Cys Glu Asn Cys Asp Asn Asn
100 105 110

Leu Glu Asn Tyr Cys Pro Gly Gln Ile Met Thr Tyr Asn Gly Ile Tyr
115 120 125

Ile Asp Gly Thr Thr Thr Tyr Gly Gly Tyr Ser Asn Ile Met Val Thr
130 135 140

Asp Glu His Tyr Val Val His Trp Pro Glu Asn Leu Pro Met Glu Ala
145 150 155 160

Ala Pro Leu Leu Cys Ala Gly Ile Thr Thr Tyr Ser Pro Leu Lys Tyr
165 170 175

Phe Gly Leu Asp Lys Pro Gly Met His Ile Gly Val Val Gly Leu Gly
180 185 190

Gly Leu Gly His Met Ala Val Lys Phe Ala Lys Ala Phe Gly Thr Lys
195 200 205

Val Thr Val Ile Ser Thr Ser Ala Ser Lys Lys Gln Glu Ala Ile Gly
210 215 220

Arg Leu Gly Ala Asp Ser Phe Leu Val Ser Arg Asp Pro Asp Gln Met
225 230 235 240

Gln Ala Ala Ala Gly Ser Leu Asp Gly Ile Ile Asp Thr Val Ser Ala
245 250 255

Ile His Pro Leu Leu Pro Leu Ile Asn Leu Leu Lys Thr His Gly Lys
260 265 270

Leu Val Met Val Gly Ala Pro Glu Lys Pro Leu Glu Leu Pro Val Phe
275 280 285

Pro Leu Leu Leu Gly Arg Lys Leu Val Ala Gly Ser Ala Ile Gly Gly
290 295 300

Ile Lys Glu Thr Gln Glu Met Val Asp Phe Ala Ala Lys His Asn Ile
305 310 315 320

Thr Pro Asp Val Glu Val Val Pro Met Asp Tyr Val Asn Thr Ala Leu
325 330 335

Asp Arg Leu Leu Lys Ser Asp Val Lys Tyr Arg Phe Val Leu Asp Val
340 345 350

Gly Asn Thr Leu Asn Lys Asn
355

<210> 22

<211> 1083

<212> DNA

<213> Arabidopsis thaliana

<400> 22

atggcgaaat ctccagaaac agagcatccg aacaaagtct ttggttgggg tgctagagac

aaatccggtg ttctctctcc tttcacttc tctagaagag acaatggtga aaatgatgtg 120
 acagtgaaga tcttgttctg tggagtttgc cacactgatt tacacaccat caaaaacgac 180
 tggggatact cgtattaccc agtagttcca gggcatgaaa tcggtgggat cgctacaaaa 240
 gttggtgaaga acgtgactaa attcaaagaa ggagatcgtg tcggagtagg agtgatcagt 300
 ggctcgtgcc aatcttgcca atcttgtgac caagatcttg aaaactactg tcctcaaatg 360
 tctttcacat acaatgcatg tggatccgat ggaaccaaga attacggtgg ctattcggag 420
 aacattgtgg ttgatcaacg gtttgttttg cggtttccgg agaatttacc gagcgattcg 480
 ggtgcgccgt tgctgtgtgc tggaatcact gtgtatagtc caatgaagta ttatggtatg 540
 actgaggcag ggaagcattt aggggttgcg ggacttgggtg ggcttgggtca tgttgctggt 600
 aagattggtg aagcttttgg tttgaaagtt actgtcatta gttcttcttc tacgaaagca 660
 gaggaagcca ttaatcatct tgggtcgtgat togtttcttg tcacaactga tcctcagaaa 720
 atgaaggctg caattggaac aatggactac attatcgata cgatadcagc agtacatgct 780
 ctgtatccgt tgctcggttt actcaaagtc aacggaaagc tcattgcttt aggcttacct 840
 gagaagcctc tcgagctacc aatgttcctt cttgttctcg gaaggaaaat ggttggagga 900
 agtgacgtgg gagggatgaa ggagacacaa gagatgcttg atttctgctc taagcacaac 960
 attacagctg atattgaatt gattaagatg gatgagatta aactgctgat ggagaggctt 1020
 gctaagtctg atgttaggta caggttcgtg atcaacgtgg ctaactcctt gagccctcca 1080
 tga 1083

<210> 23
 <211> 360
 <212> PRT
 <213> *Arabidopsis thaliana*

<400> 23

Met Ala Lys Ser Pro Glu Thr Glu His Pro Asn Lys Val Phe Gly Trp
 1 5 10 15

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

Arg Asp Asn Gly Glu Asn Asp Val Thr Val Lys Ile Leu Phe Cys Gly
 35 40 45

Val Cys His Thr Asp Leu His Thr Ile Lys Asn Asp Trp Gly Tyr Ser
 50 55 60

Tyr Tyr Pro Val Val Pro Gly His Glu Ile Val Gly Ile Ala Thr Lys
65 70 75 80

Val Gly Lys Asn Val Thr Lys Phe Lys Glu Gly Asp Arg Val Gly Val
85 90 95

Gly Val Ile Ser Gly Ser Cys Gln Ser Cys Glu Ser Cys Asp Gln Asp
100 105 110

Leu Glu Asn Tyr Cys Pro Gln Met Ser Phe Thr Tyr Asn Ala Ile Gly
115 120 125

Ser Asp Gly Thr Lys Asn Tyr Gly Gly Tyr Ser Glu Asn Ile Val Val
130 135 140

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

Gly Ala Pro Leu Leu Cys Ala Gly Ile Thr Val Tyr Ser Pro Met Lys
165 170 175

Tyr Tyr Gly Met Thr Glu Ala Gly Lys His Leu Gly Val Ala Gly Leu
180 185 190

Gly Gly Leu Gly His Val Ala Val Lys Ile Gly Lys Ala Phe Gly Leu
195 200 205

Lys Val Thr Val Ile Ser Ser Ser Ser Thr Lys Ala Glu Glu Ala Ile
210 215 220

Asn His Leu Gly Ala Asp Ser Phe Leu Val Thr Thr Asp Pro Gln Lys
225 230 235 240

Met Lys Ala Ala Ile Gly Thr Met Asp Tyr Ile Ile Asp Thr Ile Ser
245 250 255

Ala Val His Ala Leu Tyr Pro Leu Leu Gly Leu Leu Lys Val Asn Gly
260 265 270

Lys Leu Ile Ala Leu Gly Leu Pro Glu Lys Pro Leu Glu Leu Pro Met
275 280 285

Phe Pro Leu Val Leu Gly Arg Lys Met Val Gly Gly Ser Asp Val Gly
290 295 300

Gly Met Lys Glu Thr Gln Glu Met Leu Asp Phe Cys Ala Lys His Asn

<213> Pinus taeda

<400> 25

Met Gly Ser Leu Glu Ser Glu Lys Thr Val Thr Gly Tyr Ala Ala Arg
1 5 10 15

Asp Ser Ser Gly His Leu Ser Pro Tyr Thr Tyr Asn Leu Arg Lys Lys
20 25 30

Gly Pro Glu Asp Val Ile Val Lys Val Ile Tyr Cys Gly Ile Cys His
35 40 45

Ser Asp Leu Val Gln Met Arg Asn Glu Met Gly Met Ser His Tyr Pro
50 55 60

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

Glu Val Lys Lys Phe Lys Val Gly Glu His Val Gly Val Gly Cys Ile
85 90 95

Val Gly Ser Cys Arg Ser Cys Gly Asn Cys Asn Gln Ser Met Glu Gln
100 105 110

Tyr Cys Ser Lys Arg Ile Trp Thr Tyr Asn Asp Val Asn His Asp Gly
115 120 125

Thr Pro Thr Gln Gly Gly Phe Ala Ser Ser Met Val Val Asp Gln Met
130 135 140

Phe Val Val Arg Ile Pro Glu Asn Leu Pro Leu Glu Gln Ala Ala Pro
145 150 155 160

Leu Leu Cys Ala Gly Val Thr Val Phe Ser Pro Met Lys His Phe Ala
165 170 175

Met Thr Glu Pro Gly Lys Lys Cys Gly Ile Leu Gly Leu Gly Gly Val
180 185 190

Gly His Met Gly Val Lys Ile Ala Lys Ala Phe Gly Leu His Val Thr
195 200 205

Val Ile Ser Ser Ser Asp Lys Lys Lys Glu Glu Ala Met Glu Val Leu
210 215 220

Gly Ala Asp Ala Tyr Leu Val Ser Lys Asp Thr Glu Lys Met Met Glu

ggaaaggcat ttggtttgag tgtaacggtt tttagcacta gtatatccaa gaaagaggag	660
gcactgagcc tgcttggcgc agacaaattt gttgtttcat ctaatcaaga ggaaatgacg	720
gcgttggcta aatcgttgga ctttataatc gacacagcat ctggtgatca ctcgtttgat	780
ccttacatgt cactgctgaa gacatatggt gtttttgtcc tagttggttt ccctagtcaa	840
gtcaaattta tccctgcaag ccttaataata ggatcaaaga ctggtgccgg aagtgttaca	900
ggtgttacia aagatataca ggagatgatt ggcttctgtg ctgcaaacga gattcaccca	960
aatatagagg tgattccaat cgagtatgcc aatgaagctc ttgagaggct cataaatagg	1020
gacgtcaagt accggtttgt aatagatggt gagaattccc tgaaagaaaa atga	1074