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SEQUENCE LISTING

<110> Monsanto Technology LLC
Baum, James A
Cerruti, Thomas
Flasinski, Stanislaw
Fu, Xiaoran
Howe, Arlene R
Salvador, Sara

<120> Lepidopteran-Active Cry1Da1 Amino Acid Sequence Variant Proteins

<130> P34223W000/0022270.00078

<150> US 62/064994
<151> 2014-10-16

<150> US 62/065017
<151> 2014-10-17

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<170> PatentIn version 3.5

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 <223> Amino acid sequence of the protein Cry1Da1.

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Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
 35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
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Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
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Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
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Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
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130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

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Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
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Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser
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Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
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Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
850 855 860

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Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
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930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
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Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
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Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
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Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
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Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
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Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
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675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg
770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
805 810 815

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
835 840 845

P34223W000_SEQ_PCT

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
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Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
965 970 975

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
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Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
995 1000 1005

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly
1010 1015 1020

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr
1025 1030 1035

P34223W000_SEQ_PCT

Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr Pro
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Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu
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Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala
1070 1075 1080

Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr
1085 1090 1095

Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys Glu
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Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr
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Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp
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Glu Leu Leu Leu Met Glu Glu
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<211> 3498

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence used for expression in a bacterial cell
encoding Cry1Da1_4.

<400> 5

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<210> 6
 <211> 1165
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Amino acid sequence of the engineered insecticidal protein
 Cry1Da1_4.

<400> 6

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Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly Asn
 20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
 35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
 50 55 60

P34223W000_SEQ_PCT

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65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
355 360 365

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

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
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Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
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Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val
595 600 605

Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser
625 630 635 640

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Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys
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His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg
770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
805 810 815

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
820 825 830

P34223W000_SEQ_PCT

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
965 970 975

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
980 985 990

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
995 1000 1005

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly
1010 1015 1020

P34223W000_SEQ_PCT

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr
1025 1030 1035

Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr Pro
1040 1045 1050

Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu
1055 1060 1065

Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala
1070 1075 1080

Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr
1085 1090 1095

Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys Glu
1100 1105 1110

Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr
1115 1120 1125

Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp
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Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val
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Glu Leu Leu Leu Met Glu Glu
1160 1165

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<211> 3498

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence used for expression in a bacterial cell

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encoding Cry1Da1_5.

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<210> 8

<211> 1165

<212> PRT

<213> Artificial Sequence

<220>

<223> Amino acid sequence of the engineered insecticidal protein
Cry1Da1_5.

<400> 8

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Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
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Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
 85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
 100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
 115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
 130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
 165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
 180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
 195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
 210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
 225 230 235 240

P34223W000_SEQ_PCT

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Arg
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

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Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val
595 600 605

Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val
610 615 620

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Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg
770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
805 810 815

P34223W000_SEQ_PCT

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
965 970 975

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
980 985 990

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
995 1000 1005

P34223W000_SEQ_PCT

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly
1010 1015 1020

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr
1025 1030 1035

Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr Pro
1040 1045 1050

Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu
1055 1060 1065

Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala
1070 1075 1080

Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr
1085 1090 1095

Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys Glu
1100 1105 1110

Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr
1115 1120 1125

Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp
1130 1135 1140

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1145 1150 1155

Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 9
<211> 3498
<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence used for expression in a bacterial cell encoding Cry1Da1_6.

<400> 9

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gttcaagccg caaacttaca tttatctatt ttaagggatg tttcagtttt cggagaaaaga	540
tggggatatg atacagcgac tatcaataat cgctatagtg atctgactag ccttattcat	600
gtttatacta accattgtgt ggatacgtat aatcagggat taaggcgttt ggaaggctgt	660
tttcttagcg attggattgt atataatcgt ttccggagac aattgacaat ttcagtatta	720
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atatttagaa cactttcata tccaacaggc cttgacaatt caaatcctgt agctggaatc	1140
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gacggggaaa aatgtgcaca tcattctcat catttctctt tggacattga tgttggatgt	2460
acagacttaa atgaggactt aggtgtatgg gtgatattca agattaagac gcaagatggc	2520
cacgcacgac tagggaatct agagtttctc gaagagaaac cattattagg agaagcacta	2580
gctcgtgtga aaagagcgga gaaaaaatgg agagacaaac gcgaaacatt acaattggaa	2640
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atttttgaag aattagaaga gcgtattttc actgcatttt ccctatatga tgcgagaaat	2880
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aaatcgtata cagatagacg aagagagaat ctttgtgaat ctaacagagg atatggagat	3360
tacacaccac taccagctgg ttatgtaaca aaggaattag agtacttccc agagaccgat	3420
aaggtatgga ttgagattgg agaaacagaa ggaacattca tcgtggacag cgtggaatta	3480
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<210> 10

<211> 1165

<212> PRT

<213> Artificial Sequence

<220>

<223> Amino acid sequence of the engineered insecticidal protein Cry1Da1_6.

<400> 10

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			20					25					30		

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Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

P34223W000_SEQ_PCT

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

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

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Pro
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

P34223W000_SEQ_PCT

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val
595 600 605

P34223W000_SEQ_PCT

Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg
770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

P34223W000_SEQ_PCT

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
805 810 815

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
965 970 975

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
980 985 990

P34223W000_SEQ_PCT

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
 995 1000 1005

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly
 1010 1015 1020

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr
 1025 1030 1035

Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr Pro
 1040 1045 1050

Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu
 1055 1060 1065

Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala
 1070 1075 1080

Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr
 1085 1090 1095

Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys Glu
 1100 1105 1110

Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr
 1115 1120 1125

Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp
 1130 1135 1140

Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val
 1145 1150 1155

Glu Leu Leu Leu Met Glu Glu
 1160 1165

P34223W000_SEQ_PCT

<210> 11
 <211> 3498
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Nucleotide sequence used for expression in a bacterial cell encoding Cry1Da1_7.

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aaagagggat atggagaagg ttgcgtaacg atccatgaga tcgagaacaa tacagacgaa	3120
ctgaaattca acaactgtgt agaagaggaa gtatatccaa acaacacggt aacgtgtatt	3180
aattatactg cgactcaaga agaatatgag ggtacgtaca cttctcgtaa tcgaggatat	3240
gacgaagcct atggtaataa ccttccgta ccagctgatt atgcgtcagt ctatgaagaa	3300
aaatcgtata cagatagacg aagagagaat ctttgtgaat ctaacagagg atatggagat	3360
tacacaccac taccagctgg ttatgtaaca aaggaattag agtacttccc agagaccgat	3420
aaggatatgga ttgagattgg agaaacagaa ggaacattca tcgtggacag cgtggaatta	3480
ctccttatgg aggaatag	3498

<210> 12
 <211> 1165
 <212> PRT
 <213> Artificial sequence

<220>
 <223> Amino acid sequence of the engineered insecticidal protein Cry1Da1_7.

<400> 12

Met	Glu	Ile	Asn	Asn	Gln	Asn	Gln	Cys	Val	Pro	Tyr	Asn	Cys	Leu	Ser
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P34223W000_SEQ_PCT

Asn	Pro	Lys	Glu	Ile	Ile	Leu	Gly	Glu	Glu	Arg	Leu	Glu	Thr	Gly	Asn	20	25	30	
Thr	Val	Ala	Asp	Ile	Ser	Leu	Gly	Leu	Ile	Asn	Phe	Leu	Tyr	Ser	Asn	35	40	45	
Phe	Val	Pro	Gly	Gly	Gly	Phe	Ile	Val	Gly	Leu	Leu	Glu	Leu	Ile	Trp	50	55	60	
Gly	Phe	Ile	Gly	Pro	Ser	Gln	Trp	Asp	Ile	Phe	Leu	Ala	Gln	Ile	Glu	65	70	75	80
Gln	Leu	Ile	Ser	Gln	Arg	Ile	Glu	Glu	Phe	Ala	Arg	Asn	Gln	Ala	Ile	85	90	95	
Ser	Arg	Leu	Glu	Gly	Leu	Ser	Asn	Leu	Tyr	Lys	Val	Tyr	Val	Arg	Ala	100	105	110	
Phe	Ser	Asp	Trp	Glu	Lys	Asp	Pro	Thr	Asn	Pro	Ala	Leu	Arg	Glu	Glu	115	120	125	
Met	Arg	Ile	Gln	Phe	Asn	Asp	Met	Asn	Ser	Ala	Leu	Ile	Thr	Ala	Ile	130	135	140	
Pro	Leu	Phe	Arg	Val	Gln	Asn	Tyr	Glu	Val	Ala	Leu	Leu	Ser	Val	Tyr	145	150	155	160
Val	Gln	Ala	Ala	Asn	Leu	His	Leu	Ser	Ile	Leu	Arg	Asp	Val	Ser	Val	165	170	175	
Phe	Gly	Glu	Arg	Trp	Gly	Tyr	Asp	Thr	Ala	Thr	Ile	Asn	Asn	Arg	Tyr	180	185	190	
Ser	Asp	Leu	Thr	Ser	Leu	Ile	His	Val	Tyr	Thr	Asn	His	Cys	Val	Asp	195	200	205	

P34223W000_SEQ_PCT

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

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

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Pro
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

P34223W000_SEQ_PCT

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

P34223W000_SEQ_PCT

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val
595 600 605

Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg
770 775 780

P34223W000_SEQ_PCT

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
805 810 815

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
965 970 975

P34223W000_SEQ_PCT

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
 980 985 990

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
 995 1000 1005

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly
 1010 1015 1020

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr
 1025 1030 1035

Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr Pro
 1040 1045 1050

Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu
 1055 1060 1065

Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala
 1070 1075 1080

Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr
 1085 1090 1095

Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys Glu
 1100 1105 1110

Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr
 1115 1120 1125

Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp
 1130 1135 1140

Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val
 1145 1150 1155

P34223W000_SEQ_PCT

Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 13
<211> 3420
<212> DNA
<213> Artificial sequence

<220>
<223> Nucleotide sequence used for expression in a bacterial cell encoding TIC844.

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ctcatcaact tcctctacag caacttcgtg cccggcggtg gcttcatcgt gggcctcctg 180
gagcttatct ggggcttcat cggcccgctc cagtgggaca tcttcctcgc ccagatcgag 240
caactgatca gccagcggat cgaggagttc gctaggaacc aggccatctc ccgcctggag 300
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accaaccggg ccctccgca ggaaatgcgt atccagttca acgatatgaa ctcggccctc 420
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gacttcctca actccttcac catctacacc gactccctcg cccgctacgc ctactggggc 960
ggtcacctcg tgaactcctt ccgcaccggc accactacca acctcatccg cagcccgtc 1020

P34223W000_SEQ_PCT

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gagggcgt	gg	agttccagaa	caccatctcc	aggagcatct	accgcaagag	cggccctatc	1200
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gagaactacg	tgactctcct	gggcactttc	gacgagtgt	accctaccta	cttgtaccag		2160
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gacagccaag	acctcgagat	ttacctgatc	cgctacaacg	ccaagcacga	gaccgtcaac		2280
gtgcccggta	ctggttccct	ctggccgctg	agcgcccca	gcccgatcgg	caagtgtgcc		2340
caccacagcc	accacttctc	cttggacatc	gatgtgggct	gcaccgacct	gaacgaggac		2400
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gaggccaagg agagcgtcga cgccctgttc gtgaactccc agtacgaccg cctgcaggcc	2640
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aacagcagcg ttcctgctga ctacgcttcc gcctacgagg agaaggccta cacggatggc	3240
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ggctacgtta ccaaggagct ggagtacttc ccggagactg acaagggtgtg gatcgagatc	3360
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<210> 14

<211> 1139

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the chimeric protein TIC844.

<400> 14

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20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

P34223W000_SEQ_PCT

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

P34223W000_SEQ_PCT

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

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Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

P34223W000_SEQ_PCT

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

P34223W000_SEQ_PCT

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
 980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
 995 1000 1005

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
 1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
 1025 1030 1035

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
 1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
 1055 1060 1065

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
 1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
 1085 1090 1095

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
 1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
 1115 1120 1125

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
 1130 1135

<210> 15
 <211> 3420
 <212> DNA
 <213> Artificial sequence

P34223W000_SEQ_PCT

<220>

<223> Nucleotide sequence used for expression in a bacterial cell encoding TIC844_2.

<400> 15

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cttattaatt ttctatattc taattttgta ccaggaggag gatttatagt aggtttacta	180
gaattaatat ggggatttat agggccttcg caatgggata tttttttagc tcaaattgag	240
caattgatta gtcaaagaat agaagaattt gctaggaatc aggcaatttc aagattggag	300
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gttcaagccg caaacttaca tttatctatt ttaagggatg tttcagtttt cggagaaaga	540
tggggatatg atacagcgac tatcaataat cgctatagtg atctgactag ccttattcat	600
gtttatacta accatttgtt ggatacgtat aatcagggat taaggcgttt ggaaggctgt	660
tttcttagcg attggattgt atataatcgt ttccggagac aattgacaat ttcagtatta	720
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cagctaacga gggaagtcta tctggattta ctttttatta atgaaaatct ttctcctgca	840
gcaagctatc caaccttttc agctgctgaa agtgctataa ttagaagtcc tcatttagta	900
gactttttta atagctttac catttataca gatagtctgg cacgttctgc atattgggga	960
gggcacttgg taaattcttt ccgcacagga accactacta atttgataag atccccttta	1020
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atatttagaa cactttcata tattacaggc cttgacaatt cacatcctgt agctggaatc	1140
gagggagtgg aattccaaaa tactataagt agaagtatct atcgtaaaaag cgggtccaata	1200
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cctggattta caggtggaga tattctgact aggaatagta tgggcgagct ggggacctta	1500
cgagtaacct tcacaggaag attaccacaa agttattata tacgtttccg ttatgcttcg	1560
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ccaaaaacta tggacgcagg tgaaccacta acatctcggt cgttcgctca tacaacactc	1680
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gtttatatag atcgaattga atttataccg gttactgcaa catttgaggc agaatatgat	1800
ttagaaagag cacaaaaggc ggtgaatgag ctgtttactt cttccaatca aatcgggtta	1860
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gatgaatttt gtctggatga aaaaaaagaa ttgtccgaga aagtcaaaca tgcgaagcga	1980
cttagtgatg agcgggaattt acttcaagat ccaaacttta gagggatcaa tagacaacta	2040
gaccgtggct ggagaggaag tacggatatt accatccaag gaggcgatga cgtattcaaa	2100
gagaattacg ttacgctatt gggtagcttt gatgagtgct atccaacgta tttatatcaa	2160
aaaatagatg agtcgaaatt aaaagcctat acccggtacc aattaagagg gtatatcgaa	2220
gatagtcaag acttagaaat ctatttaatt cgctacaatg ccaaacacga aacagtaa	2280
gtgccaggta cgggttcctt atggccgctt tcagcccaa gtccaatcgg aaaatgtgcc	2340
catcattccc atcatttctc cttggacatt gatgttggat gtacagactt aaatgaggac	2400
ttaggtgtat gggatgatatt caagattaag acgcaagatg gccatgcaag actaggaa	2460
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gagaaaaaat ggagagacaa acgtgaaaaa ttggaatggg aaacaaatat tgtttataaa	2580
gaggcaaaaag aatctgtaga tgctttatct gttaaactctc aatatgatag attacaagcg	2640
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ggttgcgtaa ccattcatga gatcgagaac aatacagacg aactgaagtt tagcaactgt	3060
gtagaagagg aagtatatcc aaacaacacg gtaacgtgta atgattatac tgcgactcaa	3120
gaagaatatg agggtagcta cacttctcgt aatcgaggat atgacggagc ctatgaaagc	3180
aattcttctg taccagctga ttatgcatca gcctatgaag aaaaagcata tacagatgga	3240
cgaagagaca atccttgtga atctaacaga ggatatgggg attacacacc actaccagct	3300
ggctatgtga caaaagaatt agagtacttc ccagaaaccg ataaggtatg gattgagatc	3360
ggagaaacgg aaggaacatt catcgtggac agcgtggaat tacttcttat ggaggaatag	3420

<210> 16

<211> 1139

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal chimeric protein TIC844_2.

<400> 16

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Asn	Pro	Lys	Glu	Ile	Ile	Leu	Gly	Glu	Glu	Arg	Leu	Glu	Thr	Gly	Asn
			20					25					30		

Thr	Val	Ala	Asp	Ile	Ser	Leu	Gly	Leu	Ile	Asn	Phe	Leu	Tyr	Ser	Asn
		35					40					45			

P34223W000_SEQ_PCT

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

P34223W000_SEQ_PCT

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
355 360 365

Thr Gly Leu Asp Asn Ser His Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Leu
420 425 430

P34223W000_SEQ_PCT

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

P34223W000_SEQ_PCT

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

P34223W000_SEQ_PCT

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
995 1000 1005

P34223W000_SEQ_PCT

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
1025 1030 1035

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
1055 1060 1065

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
1085 1090 1095

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
1115 1120 1125

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135

<210> 17

<211> 3420

<212> DNA

<213> Artificial sequence

<220>

<223> Nucleotide sequence used for expression in a bacterial cell encoding TIC844_4.

<400> 17

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60

P34223W000_SEQ_PCT

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gaattaatat ggggatttat agggccttcg caatgggata tttttttagc tcaaattgag	240
caattgatta gtcaaagaat agaagaattt gctaggaatc aggcaatttc aagattggag	300
gggctaagca atctttataa ggtctatgtt agagcgttta gcgactggga gaaagatcct	360
actaatcctg ctttaaggga agaaatgcgt atacaattta atgacatgaa tagtgctctc	420
ataacggcta ttccactttt tagagttcaa aattatgaag ttgctctttt atctgtatat	480
gttcaagccg caaacttaca tttatctatt ttaagggatg tttcagtttt cggagaaaga	540
tggggatatg atacagcgac tatcaataat cgctatagtg atctgactag cttattcat	600
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tttcttagcg attggattgt atataatcgt ttccggagac aattgacaat ttcagtatta	720
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tttaataatg gcttatcctg ctggaacgtg aaagggcatg tagatgtaga agaacaaaac	2880
aaccaccgtt cggctccttgt tggtccggaa tgggaagcag aagtgtcaca agaagttcgt	2940

P34223W000_SEQ_PCT

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 ggctatgtga caaaagaatt agagtacttc ccagaaaccg ataaggtatg gattgagatc 3360
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<210> 18
 <211> 1139
 <212> PRT
 <213> Artificial sequence

<220>
 <223> Amino acid sequence of the engineered insecticidal chimeric protein TIC844_4.

<400> 18

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Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly Asn
 20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
 35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
 50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
 65 70 75 80

P34223W000_SEQ_PCT

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

P34223W000_SEQ_PCT

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

P34223W000_SEQ_PCT

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

P34223W000_SEQ_PCT

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

P34223W000_SEQ_PCT

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
995 1000 1005

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
1025 1030 1035

P34223W000_SEQ_PCT

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
1055 1060 1065

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
1085 1090 1095

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
1115 1120 1125

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135

<210> 19
<211> 3420
<212> DNA
<213> Artificial sequence

<220>
<223> Nucleotide sequence used for expression in a bacterial cell
encoding TIC844_5.

<400> 19
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ataatattag gcgaggaaag gctagaaaca gggaatactg tagcagacat ttcattaggg 120
cttattaatt ttctatattc taattttgta ccaggaggag gatttatagt aggtttacta 180
gaattaatat ggggatttat agggccttcg caatgggata tttttttagc tcaaattgag 240
caattgatta gtcaaagaat agaagaattt gctaggaatc aggcaatttc aagattggag 300

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ataacggcta ttccactttt tagagttcaa aattatgaag ttgctctttt atctgtatat	480
gttcaagccg caaacttaca tttatctatt ttaagggatg tttcagtttt cggagaaaga	540
tggggatatg atacagcgac tatcaataat cgctatagtg atctgactag cttattcat	600
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gactttttaa atagctttac catttataca gatagtctgg cacgttctgc atattgggga	960
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cttagtgatg agcgggaatff acttcaagat ccaaacttta gagggatcaa tagacaacta	2040
gaccgtggct ggagaggaag tacggatatt accatccaag gaggcgatga cgtattcaaa	2100
gagaattacg ttacgctatt gggtagctff gatgagtgc tccaacgta tttatatcaa	2160
aaaatagatg agtcgaaatt aaaagcctat acccgttacc aattaagagg gtatatcgaa	2220
gatagtcaag acttagaaat ctattttaatt cgctacaatg ccaaacacga aacagtaa	2280
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tatctgcctg agctgtctgt gattccgggt gtcaatgcgg ctatffttga agaattagaa	2760
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aaccaccgtt cggtccttgt tgttccggaa tgggaagcag aagtgtcaca agaagttcgt	2940
gtctgtccgg gtcgtggcta tatccttcgt gtcacagcgt acaaggaggg atatggagaa	3000
ggttgcgtaa ccattcatga gatcgagaac aatacagacg aactgaagtt tagcaactgt	3060
gtagaagagg aagtatatcc aaacaacacg gtaacgtgta atgattatac tgcgactcaa	3120
gaagaatatg agggtagcta cacttctcgt aatcgaggat atgacggagc ctatgaaagc	3180

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ggctatgtga caaaagaatt agagtacttc ccagaaaccg ataaggtatg gattgagatc 3360
ggagaaacgg aaggaacatt catcgtggac agcgtggaat tacttcttat ggaggaatag 3420

<210> 20

<211> 1139

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal chimeric protein TIC844_5.

<400> 20

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1 5 10 15

Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly Asn
20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

P34223W000_SEQ_PCT

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

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

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

P34223W000_SEQ_PCT

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Pro
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

P34223W000_SEQ_PCT

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

P34223W000_SEQ_PCT

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

P34223W000_SEQ_PCT

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
995 1000 1005

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
1025 1030 1035

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
1055 1060 1065

P34223W000_SEQ_PCT

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
1085 1090 1095

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
1115 1120 1125

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135

<210> 21
<211> 3420
<212> DNA
<213> Artificial sequence

<220>
<223> Nucleotide sequence used for expression in a bacterial cell
encoding TIC844_6.

<400> 21
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cttattaatt ttctatattc taattttgta ccaggaggag gatttatagt aggtttacta 180
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caattgatta gtcaaagaat agaagaattt gctaggaatc aggcaatttc aagattggag 300
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ataacggcta ttccactttt tagagttcaa aattatgaag ttgctctttt atctgtatat 480
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ttagaaagag cacaaaaggc ggtgaatgag ctgtttactt cttccaatca aatcgggtta	1860
aaaacagatg tgacggatta tcatattgat caagtatcca atttagttga gtgtttatct	1920
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P34223W000_SEQ_PCT

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gagaattacg ttacgctatt gggtagcttt gatgagtgct atccaacgta tttatatcaa	2160
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ggttgcgtaa ccattcatga gatcgagaac aatacagacg aactgaagtt tagcaactgt	3060
gtagaagagg aagtatatcc aaacaacacg gtaacgtgta atgattatac tgcgactcaa	3120
gaagaatatg agggtagcta cacttctcgt aatcgaggat atgacggagc ctatgaaagc	3180
aattcttctg taccagctga ttatgcatca gcctatgaag aaaaagcata tacagatgga	3240
cgaagagaca atccttgatg atctaacaga ggatatgggg attacacacc actaccagct	3300
ggctatgtga caaaagaatt agagtacttc ccagaaaccg ataaggatatg gattgagatc	3360
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P34223W000_SEQ_PCT

<210> 22
 <211> 1139
 <212> PRT
 <213> Artificial sequence

<220>
 <223> Amino acid sequence of the engineered insecticidal chimeric protein TIC844_6.

<400> 22

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 1 5 10 15

Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly Asn
 20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
 35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
 50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
 65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
 85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
 100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
 115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
 130 135 140

P34223W000_SEQ_PCT

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145 150 155 160

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

P34223W000_SEQ_PCT

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340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
355 360 365

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

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

P34223W000_SEQ_PCT

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

P34223W000_SEQ_PCT

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

P34223W000_SEQ_PCT

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
995 1000 1005

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
1025 1030 1035

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
1055 1060 1065

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
1085 1090 1095

P34223W000_SEQ_PCT

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
1115 1120 1125

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135

<210> 23

<211> 3420

<212> DNA

<213> Artificial sequence

<220>

<223> Nucleotide sequence used for expression in a bacterial cell
encoding TIC844_7.

<400> 23

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cttattaatt ttctatattc taattttgta ccaggaggag gatttatagt aggtttacta	180
gaattaatat ggggatattat agggccttcg caatgggata ttttttttagc tcaaattgag	240
caattgatta gtcaaagaat agaagaattt gctaggaatc aggcaatttc aagattggag	300
gggctaagca atctttataa ggtctatggt agagcgttta gcgactggga gaaagatcct	360
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ataacggcta ttccactttt tagagttcaa aattatgaag ttgctctttt atctgtatat	480
gttcaagccg caaacttaca tttatctatt ttaagggatg tttcagtttt cggagaaaga	540
tggggatatg atacagcgac tatcaataat cgctatagtg atctgactag ccttattcat	600
gtttatacta accattgtgt ggatacgtat aatcagggat taaggcgttt ggaaggctcgt	660
tttcttagcg attggattgt atataatcgt ttccggagac aattgacaat ttcagtatta	720
gatattgttg cgttttttcc aaattatgat attagaacat atccaattca aacagctact	780

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gacttttttaa atagcttttac catttataca gatagtctgg cacgttctgc atattgggga	960
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gattctttta gtgaattacc acctcaagat gccagcgtat ctctgcaat tgggtatagt	1260
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gaccgtggct ggagaggaag tacggatatt accatccaag gaggcgatga cgtattcaaa	2100
gagaattacg ttacgctatt gggtagcttt gatgagtgtc atccaacgta tttatatcaa	2160
aaaatagatg agtcgaaatt aaaagcctat acccggttacc aattaagagg gtatatcgaa	2220

P34223W000_SEQ_PCT

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catcattccc atcatttctc cttggacatt gatgttggat gtacagactt aaatgaggac	2400
ttaggtgtat ggggtgatatt caagattaag acgcaagatg gccatgcaag actaggaa	2460
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tatctgcctg agctgtctgt gattccgggt gtcaatgcgg ctatttttga agaattagaa	2760
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gtagaagagg aagtatatcc aaacaacacg gtaacgtgta atgattatac tgcgactcaa	3120
gaagaatatg agggtagcta cacttctcgt aatcgaggat atgacggagc ctatgaaagc	3180
aattcttctg taccagctga ttatgcatca gcctatgaag aaaaagcata tacagatgga	3240
cgaagagaca atccttgtga atctaacaga ggatatgggg attacacacc actaccagct	3300
ggctatgtga caaaagaatt agagtacttc ccagaaaccg ataaggtatg gattgagatc	3360
ggagaaacgg aaggaacatt catcgtggac agcgtggaat tacttcttat ggaggaatag	3420

<210> 24

<211> 1139

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal chimeric

P34223W000_SEQ_PCT

protein TIC844_7.

<400> 24

Met Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu Ser
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Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly Asn
20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

P34223W000_SEQ_PCT

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Arg
355 360 365

P34223W000_SEQ_PCT

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

P34223W000_SEQ_PCT

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

P34223W000_SEQ_PCT

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

P34223W000_SEQ_PCT

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
995 1000 1005

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
1025 1030 1035

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
1055 1060 1065

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
1085 1090 1095

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
1115 1120 1125

P34223W000_SEQ_PCT

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135

<210> 25
<211> 3420
<212> DNA
<213> Artificial sequence

<220>
<223> Nucleotide sequence used for expression in a bacterial cell encoding TIC844_8.

<400> 25
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gactttttta atagctttac catttataca gatagtctgg cacgttctgc atattgggga 960
gggcacttgg taaattcttt ccgcacagga accactacta atttgataag atccccctta 1020

P34223W000_SEQ_PCT

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atatttagaa cactttcata tccaacaggc cttgacaatt caaatcctgt agctggaatc	1140
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cgaagagaca atccttgtga atctaacaga ggatatgggg attacacacc actaccagct	3300
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<210> 26

<211> 1139

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal chimeric protein TIC844_8.

<400> 26

Met	Glu	Ile	Asn	Asn	Gln	Asn	Gln	Cys	Val	Pro	Tyr	Asn	Cys	Leu	Ser
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Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly Asn
20 25 30

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

P34223W000_SEQ_PCT

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

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

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Pro
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

P34223W000_SEQ_PCT

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

P34223W000_SEQ_PCT

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val
595 600 605

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
770 775 780

P34223W000_SEQ_PCT

His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
785 790 795 800

Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
805 810 815

Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
820 825 830

Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
835 840 845

Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
850 855 860

Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
865 870 875 880

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
885 890 895

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
900 905 910

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
915 920 925

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
930 935 940

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
945 950 955 960

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
965 970 975

P34223W000_SEQ_PCT

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
 980 985 990

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile
 995 1000 1005

Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu
 1010 1015 1020

Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Ala
 1025 1030 1035

Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly
 1040 1045 1050

Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp Tyr
 1055 1060 1065

Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg Asp
 1070 1075 1080

Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu
 1085 1090 1095

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
 1100 1105 1110

Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile
 1115 1120 1125

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
 1130 1135

<210> 27
 <211> 3498
 <212> DNA
 <213> Artificial sequence

P34223W000_SEQ_PCT

<220>

<223> Synthetic DNA sequence designed for plant expression encoding Cry1Da1.

<400> 27

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ctcatcaact tcctctacag caacttcgtg cccggcggtg gcttcatcgt gggcctcctg	180
gagcttatct ggggcttcat cggcccgtcc cagtgggaca tcttcctcgc ccagatcgag	240
caactgatca gccagcggat cgaggagttc gctaggaacc aggccatctc ccgcctggag	300
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accaacccgg ccctccgcga ggaaatgcgt atccagttca acgatatgaa ctcggccctc	420
atcaccgcca tcccgtcttt ccgcgtgcag aactacgagg tggccctcct gtccgtgtac	480
gttcaagccg ccaacctcca cctctccatc ctccgcgacg tgagcgtgtt cggcgagcgc	540
tggggctacg acaccgccac catcaacaac cgctactccg acctcacctc cctcatccac	600
gtttacacca accactgcgt ggacacgtac aaccagggcc tccgccgcct ggagggccgc	660
ttcctctccg actggatcgt gtacaaccgc ttccgccgcc agctcaccat ctccgtcctg	720
gacatcgtcg ctttctttcc caactacgac atccgcacct accctatcca gaccgccacc	780
cagctcaccg gcgaggctta cctcgacctc ccgttcatca acgagaacct cagcccggcc	840
gccagctacc cgaccttctc cgccgctgag tccgccatca ttgcagccc gcacctcgtg	900
gacttcctca actccttcac catctacacc gactccctcg cccgctacgc ctactggggc	960
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tacggccgcg agggcaacac cgagcgcccc gtgaccatca ccgccagccc gagcgtgccc	1080
atcttccgca ccctcagcta catcaccggc ctggacaaca gcaaccctgt ggcgggcatc	1140
gagggcgtgg agttccagaa caccatctcc aggagcatct accgcaagag cggccctatc	1200
gacagcttca gcgagctgcc tcctcaggac gccagcgtga gccctgccat cggctacagc	1260

P34223W000_SEQ_PCT

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accagatcc cttgggtcaa ggcccacacc ctggctagtgt gcgctagtgt catcaagggc	1440
cctggcttca ccggtggtga catcctgacc aggaactcta tgggcgagct gggcactctg	1500
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gacggcgaga agtgcgcccc ccatagccac cacttctctc tggacatcga cgtgggctgc	2460
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cacgccaggc tgggtaacct ggagttcctt gaggaaaagc ctctgctggg tgaggccctg	2580
gccagggctca agagggctga gaagaaatgg agggataaga gggagaccct gcagctggag	2640
accactatcg tctacaagga ggctaaggag tctgtcgatg ctctgttcgt caactctcag	2700

P34223W000_SEQ_PCT

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atcttcgagg aacttgagga acggatcttc actgcgttta gtctttacga tgcgcggaac	2880
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aactacacgg caacgcaaga ggaatacgag gggacgtaca cctcgcgtaa tagagggtat	3240
gatgaggcgt acggaaacaa cccgtcgggt ccagcagatt atgcctcggg ttatgaggag	3300
aagtcgtaca cggatagacg acgcgagaat ccatgtgagt caaatcgagg atacggagat	3360
tacacaccat taccagcagg atacgttaca aaggagttag aatacttccc ggaaacagat	3420
aaagtttggg ttgaaatcgg agaaacagaa ggaacattca tcgtcgactc agtagaattg	3480
ttgttgatgg aagaatga	3498

<210> 28

<211> 1165

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of Cry1Da1 encoded by a synthetic DNA sequence.

<400> 28

Met	Glu	Ile	Asn	Asn	Gln	Asn	Gln	Cys	Val	Pro	Tyr	Asn	Cys	Leu	Ser
1				5				10						15	

Asn	Pro	Lys	Glu	Ile	Ile	Leu	Gly	Glu	Glu	Arg	Leu	Glu	Thr	Gly	Asn
			20					25					30		

P34223W000_SEQ_PCT

Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser Asn
35 40 45

Phe Val Pro Gly Gly Gly Phe Ile Val Gly Leu Leu Glu Leu Ile Trp
50 55 60

Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile Glu
65 70 75 80

Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala Ile
85 90 95

Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg Ala
100 105 110

Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu Glu
115 120 125

Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala Ile
130 135 140

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

Val Gln Ala Ala Asn Leu His Leu Ser Ile Leu Arg Asp Val Ser Val
165 170 175

Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg Tyr
180 185 190

Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val Asp
195 200 205

Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser Asp
210 215 220

P34223W000_SEQ_PCT

Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val Leu
225 230 235 240

Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro Ile
245 250 255

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

Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser Ala
275 280 285

Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu Asn
290 295 300

Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp Gly
305 310 315 320

Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val Thr
340 345 350

Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr Ile
355 360 365

Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val Glu
370 375 380

Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro Ile
385 390 395 400

Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro Ala
405 410 415

P34223W000_SEQ_PCT

Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg Ile
420 425 430

Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg Ser
435 440 445

Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile Pro
450 455 460

Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys Gly
465 470 475 480

Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly Glu
485 490 495

Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser Tyr
500 505 510

Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr Phe
515 520 525

Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr Met
530 535 540

Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr Leu
545 550 555 560

Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu Tyr
565 570 575

Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val Thr
580 585 590

Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val Val
595 600 605

P34223W000_SEQ_PCT

Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp Val
610 615 620

Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser
625 630 635 640

Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys
645 650 655

His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
660 665 670

Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser Thr
675 680 685

Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
690 695 700

Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
705 710 715 720

Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
725 730 735

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
740 745 750

Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu Trp
755 760 765

Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn Arg
770 775 780

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys Arg
785 790 795 800

P34223W000_SEQ_PCT

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
805 810 815

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
820 825 830

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
835 840 845

Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val Lys
850 855 860

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu Glu
865 870 875 880

Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
885 890 895

Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met
900 905 910

Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr Leu
915 920 925

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
930 935 940

Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
945 950 955 960

Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn Val
965 970 975

Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val Leu
980 985 990

P34223W000_SEQ_PCT

Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys
 995 1000 1005

Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly
 1010 1015 1020

Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr
 1025 1030 1035

Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr Pro
 1040 1045 1050

Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu Glu
 1055 1060 1065

Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu Ala
 1070 1075 1080

Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr
 1085 1090 1095

Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys Glu
 1100 1105 1110

Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr
 1115 1120 1125

Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp
 1130 1135 1140

Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val
 1145 1150 1155

Glu Leu Leu Leu Met Glu Glu
 1160 1165

P34223W000_SEQ_PCT

<210> 29
 <211> 3501
 <212> DNA
 <213> Artificial sequence

<220>
 <223> Synthetic DNA sequence designed for plant expression encoding
 Cry1Da1 with an additional Alanine residue inserted at position
 2.

<400> 29
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P34223W000_SEQ_PCT

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gagaagtcgt acacggatag acgacgcgag aatccatgtg agtcaaatac aggatacggg	3360
gattacacac cattaccagc aggatacgtt acaaaggagt tggaataactt cccggaaaca	3420
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<210> 30

<211> 1166

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of Cry1Da1 encoded by a synthetic DNA sequence wherein an additional Alanine residue has been inserted at position 2.

<400> 30

Met	Ala	Glu	Ile	Asn	Asn	Gln	Asn	Gln	Cys	Val	Pro	Tyr	Asn	Cys	Leu
1				5				10						15	

P34223W000_SEQ_PCT

Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile
65 70 75 80

Glu Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
100 105 110

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
115 120 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
130 135 140

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

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

Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
195 200 205

P34223W000_SEQ_PCT

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
260 265 270

Phe Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser
275 280 285

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp
305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
355 360 365

Ile Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val
370 375 380

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
385 390 395 400

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Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
450 455 460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

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Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val
595 600 605

Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
645 650 655

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser
675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
690 695 700

Val Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
740 745 750

Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu
755 760 765

Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn
770 775 780

P34223W000_SEQ_PCT

Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys
785 790 795 800

Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
805 810 815

Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
820 825 830

Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
835 840 845

Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val
850 855 860

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu
865 870 875 880

Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
885 890 895

Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala
900 905 910

Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr
915 920 925

Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
930 935 940

Glu Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
945 950 955 960

Asn Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn
965 970 975

P34223W000_SEQ_PCT

Val Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val
 980 985 990

Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
 995 1000 1005

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
 1010 1015 1020

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
 1025 1030 1035

Thr Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr
 1040 1045 1050

Pro Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu
 1055 1060 1065

Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu
 1070 1075 1080

Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val
 1085 1090 1095

Tyr Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys
 1100 1105 1110

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly
 1115 1120 1125

Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val
 1130 1135 1140

Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser
 1145 1150 1155

P34223W000_SEQ_PCT

Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 31
<211> 3501
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic DNA sequence designed for plant expression encoding
Cry1Da1_3 with an additional Alanine residue inserted at position
2.

<400> 31
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ggcctcatca acttcctcta cagcaacttc gtgcccggcg gtggcttcat cgtgggcctc 180
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ctcatcaccg ccatcccgct cttccgcgtg cagaactacg aggtggccct cctgtccgtg 480
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cacgtttaca ccaaccactg cgtggacacg tacaaccagg gcctccgccg cctggagggc 660
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gccgccagct acccgacctt ctccgccgct gagtccgcca tcattcgag cccgcacctc 900
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cccatcttcc gcaccctcag ctacatcacc ggccctggaca acagcaaccc tgtggcgggc	1140
atcgagggcg tggagttcca gaacaccatc tccaggagca tctaccgcaa gagcggccct	1200
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aaggagaact acgttaccct ccccggcacc ttcgacgagt gttacccac ctacctctac	2160
cagaagatcg acgagtccaa gctgaaggcc tacacccgct accagctccg cggctacatc	2220
gaggactccc aggacctgga aatctacctc atccgtaca acgccaagca cgagatcgtg	2280
aacgtgcctg gcaccggcag cctctggcct ctgagcgtgg agaaccagat cggcccttgc	2340
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P34223W000_SEQ_PCT

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tgcaccgacc tgaacgagga cctgggcgtg tgggttatct tcaagatcaa gacccaggac	2520
ggtcacgcca ggctgggtaa cctggagttc cttgaggaaa agcctctgct ggggtgaggcc	2580
ctggccaggg tcaagagggc tgagaagaaa tggagggata agagggagac cctgcagctg	2640
gagaccacta tcgtctacaa ggaggctaag gagtctgtcg atgctctgtt cgtcaactct	2700
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tatgatgagg cgtacggaaa caaccgctc gttccagcag attatgcctc ggtttatgag	3300
gagaagtcgt acacggatag acgacgcgag aatccatgtg agtcaaatcg aggatacggg	3360
gattacacac cattaccagc aggatacgtt acaaaggagt tggaatactt cccggaaaca	3420
gataaagttt ggattgaaat cggagaaaca gaaggaacat tcatcgtcga ctcagtagaa	3480
ttgttggtga tggaagaatg a	3501

<210> 32

<211> 1166

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal protein Cry1Da1_3 encoded by a synthetic DNA sequence wherein an

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additional Alanine residue has been inserted at position 2.

<400> 32

Met Ala Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu
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Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile
65 70 75 80

Glu Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
100 105 110

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
115 120 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
130 135 140

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

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

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Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
195 200 205

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
260 265 270

Phe Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser
275 280 285

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp
305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
355 360 365

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Ile Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val
370 375 380

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
450 455 460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

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Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val
595 600 605

Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
645 650 655

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser
675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
690 695 700

Val Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
740 745 750

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Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu
755 760 765

Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn
770 775 780

Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys
785 790 795 800

Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
805 810 815

Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
820 825 830

Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
835 840 845

Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val
850 855 860

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu
865 870 875 880

Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
885 890 895

Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala
900 905 910

Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr
915 920 925

Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
930 935 940

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Glu Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
945 950 955 960

Asn Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn
965 970 975

Val Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val
980 985 990

Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
995 1000 1005

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
1010 1015 1020

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1025 1030 1035

Thr Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr
1040 1045 1050

Pro Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu
1055 1060 1065

Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu
1070 1075 1080

Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val
1085 1090 1095

Tyr Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys
1100 1105 1110

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly
1115 1120 1125

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Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val
1130 1135 1140

Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser
1145 1150 1155

Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 33
<211> 3501
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic DNA sequence designed for plant expression encoding
Cry1Da1_4 with an additional Alanine residue inserted at position
2.

<400> 33
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ggcctcatca acttcctcta cagcaacttc gtgcccggcg gtggcttcat cgtgggcctc 180
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gagggactct ccaacctcta caaggtgtac gtgcgcgctg tcagcgactg ggagaaggac 360
ccgaccaacc cggccctccg cgaggaaatg cgtatccagt tcaacgatat gaactcggcc 420
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aacatcatca agaacgggga cttcaacaat ggtctgctgt gctggaacgt caagggtcat	2940
gtcgaggctc aggaacaaaa caatcatcgt agtgtccttg tcattcctga gtgggaggcg	3000
gaggctcttc aagaggctcg tgtttgcccg gggcgtgggt acattcttcg tgttactgcg	3060
tacaaggagg ggtacgggga ggggtgcgtt actattcatg agattgagaa caatactgat	3120
gagcttaagt tcaacaattg tgttgaggag gaggtttacc cgaacaatac tgttacgtgc	3180
atcaactaca cggcaacgca agaggaatac gaggggacgt acacctcgcg taatagaggg	3240
tatgatgagg cgtacggaaa caaccgctc gttccagcag attatgcctc ggtttatgag	3300
gagaagtcgt acacggatag acgacgcgag aatccatgtg agtcaaatcg aggatacggg	3360
gattacacac cattaccagc aggatacgtt acaaaggagt tggaatactt cccggaaaca	3420
gataaagttt ggattgaaat cggagaaaca gaaggaacat tcatcgtcga ctcagtagaa	3480
ttgttgttga tggaagaatg a	3501

<210> 34

<211> 1166

P34223W000_SEQ_PCT

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal protein Cry1Da1_4 encoded by a synthetic DNA sequence wherein an additional Alanine residue has been inserted at position 2.

<400> 34

Met Ala Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu
1 5 10 15

Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile
65 70 75 80

Glu Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
100 105 110

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
115 120 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
130 135 140

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

P34223W000_SEQ_PCT

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

Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
195 200 205

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
260 265 270

Phe Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser
275 280 285

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp
305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
340 345 350

P34223W000_SEQ_PCT

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
355 360 365

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

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
450 455 460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

P34223W000_SEQ_PCT

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val
595 600 605

Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
645 650 655

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser
675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
690 695 700

Val Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
725 730 735

P34223W000_SEQ_PCT

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
740 745 750

Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu
755 760 765

Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn
770 775 780

Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys
785 790 795 800

Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
805 810 815

Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
820 825 830

Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
835 840 845

Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val
850 855 860

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu
865 870 875 880

Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
885 890 895

Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala
900 905 910

Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr
915 920 925

P34223W000_SEQ_PCT

Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
930 935 940

Glu Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
945 950 955 960

Asn Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn
965 970 975

Val Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val
980 985 990

Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
995 1000 1005

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
1010 1015 1020

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1025 1030 1035

Thr Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr
1040 1045 1050

Pro Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu
1055 1060 1065

Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu
1070 1075 1080

Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val
1085 1090 1095

Tyr Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys
1100 1105 1110

P34223W000_SEQ_PCT

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly
1115 1120 1125

Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val
1130 1135 1140

Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser
1145 1150 1155

Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 35
<211> 3501
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic DNA sequence designed for plant expression encoding
Cry1Da1_5 with an additional Alanine residue inserted at position
2.

<400> 35
atggctgaga tcaacaacca gaaccagtgc gtcccgtaga actgcctgag caaccctaag 60
gagatcatcc tgggtgagga acgcctggag accggcaaca ccgtagccga cattagcctg 120
ggcctcatca acttcttcta cagcaacttc gtgcccggcg gtggcttcat cgtgggcctc 180
ctggagctta tctggggctt catcggtccc tcccagtggg acatcttcct cgcccagatc 240
gagcaactga tcagccagcg gatcgaggag ttcgctagga accaggccat ctcccgctg 300
gagggactct ccaacctcta caaggtgtac gtgcgcgcgt tcagcgactg ggagaaggac 360
ccgaccaacc cggccctccg cgaggaaatg cgtatccagt tcaacgatat gaactcggcc 420
ctcatcaccg ccatcccgtt cttccgcgtg cagaactacg aggtggccct cctgtccgtg 480
tacgttcaag ccgccaacct ccacctctcc atcctccgcg acgtgagcgt gttcggcgag 540
cgctgggggt acgacaccgc caccatcaac aaccgtact ccgacctcac ctccctcatc 600

P34223W000_SEQ_PCT

cacgtttaca ccaaccactg cgtggacacg tacaaccagg gcctccgccg cctggagggc	660
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ctggacatcg tcgccttctt tcccaactac gacatccgca cctaccctat ccagaccgcc	780
accagctca cccgcgaggt ctacctgac ctcccggttca tcaacgagaa cctcagcccg	840
gccgccagct acccgacctt ctccgccgct gagtccgcc tcatctgcag cccgcacctc	900
gtggacttcc tcaactcctt caccatctac accgactccc tcgcccgcag cgcctactgg	960
ggcggtcacc tcgtgaactc cttccgcacc ggcaccacta ccaacctcat ccgcagcccg	1020
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cccattctcc gcacctcag ctaccgcacc ggcttggaac acagcaaccc tgtggcgggc	1140
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atcaccaga tcccttgggt caaggccac accctggcta gtggcgctag tgtcatcaag	1440
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ctgaggggtca ctttacttgg ccgcctgcct cagtcttact acatccgctt ccgctacgct	1560
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ttccctaaga ctatggacgc tggtgagcct ctgaccagta ggagcttcgc tcacactact	1680
ctgttcactc ctatcacttt ctctagggct caggaggagt tcgacctgta catccagtct	1740
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gaccttgagc gcgcccagaa ggtgggtgaac gccctcttca ctagcactaa ccagctaggc	1860
ctgaagactg acgtgaccga ctaccacatc gaccaagtga gcaacctagt ggctgcctc	1920
tccgacgagt tctgcctcga cgagaagcgc gagctgtccg agaaggtgaa gcacgccaag	1980
cgctctccg acgagcgcaa cctgctccag gaccccaact tcaggggcat caacaggcag	2040

P34223W000_SEQ_PCT

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cagaagatcg acgagtccaa gctgaaggcc tacacccgct accagctccg cggctacatc	2220
gaggactccc aggacctgga aatctacctc atccgctaca acgccaagca cgagatcgtg	2280
aacgtgcctg gcaccggcag cctctggcct ctcagcgtgg agaaccagat cggcccttgc	2340
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agggacggcg agaagtgcgc ccaccatagc caccacttct ctctggacat cgacgtgggc	2460
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tacaaggagg ggtacgggga ggggtgcgtt actattcatg agattgagaa caatactgat	3120
gagcttaagt tcaacaattg tgttgaggag gaggtttacc cgaacaatac tgttacgtgc	3180
atcaactaca cggcaacgca agaggaatac gaggggacgt acacctcgcg taatagaggg	3240
tatgatgagg cgtacggaaa caaccgctcg gttccagcag attatgcctc ggtttatgag	3300
gagaagtcgt acacggatag acgacgcgag aatccatgtg agtcaaactc aggatacggg	3360
gattacacac cattaccagc aggatacgtt acaaaggagt tggaatactt cccggaaaca	3420
gataaagttt ggattgaaat cggagaaaca gaaggaacat tcatcgtcga ctcagtagaa	3480

ttgttgttga tggaagaatg a

3501

<210> 36
 <211> 1166
 <212> PRT
 <213> Artificial sequence

<220>
 <223> Amino acid sequence of the engineered insecticidal protein
 Cry1Da1_5 encoded by a synthetic DNA sequence wherein an
 additional Alanine residue has been inserted at position 2.

<400> 36

Met Ala Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu
 1 5 10 15

Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
 20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
 35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile
 65 70 75 80

Glu Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
 85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
 100 105 110

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
 115 120 125

P34223W000_SEQ_PCT

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
130 135 140

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

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

Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
195 200 205

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
260 265 270

Phe Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser
275 280 285

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp
305 310 315 320

P34223W000_SEQ_PCT

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
355 360 365

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

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
450 455 460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

P34223W000_SEQ_PCT

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val
595 600 605

Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
645 650 655

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser
675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
690 695 700

P34223W000_SEQ_PCT

Val Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
740 745 750

Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu
755 760 765

Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn
770 775 780

Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys
785 790 795 800

Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
805 810 815

Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
820 825 830

Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
835 840 845

Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val
850 855 860

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu
865 870 875 880

Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
885 890 895

P34223W000_SEQ_PCT

Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala
900 905 910

Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr
915 920 925

Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
930 935 940

Glu Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
945 950 955 960

Asn Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn
965 970 975

Val Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val
980 985 990

Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
995 1000 1005

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
1010 1015 1020

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1025 1030 1035

Thr Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr
1040 1045 1050

Pro Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu
1055 1060 1065

Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu
1070 1075 1080

P34223W000_SEQ_PCT

Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val
1085 1090 1095

Tyr Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys
1100 1105 1110

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly
1115 1120 1125

Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val
1130 1135 1140

Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser
1145 1150 1155

Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 37

<211> 3501

<212> DNA

<213> Artificial sequence

<220>

<223> Synthetic DNA sequence designed for plant expression encoding
Cry1Da1_6 with an additional Alanine residue inserted at position
2.

<400> 37

atggctgaga tcaacaacca gaaccagtgc gtcccgtaca actgcctgag caaccctaag 60

gagatcatcc tgggtgagga acgcctggag accggcaaca ccgtagccga cattagcctg 120

ggcctcatca acttcctcta cagcaacttc gtgcccggcg gtggcttcat cgtgggcctc 180

ctggagctta tctggggctt catcggtccc tccagtgagg acatcttcct cgccagatc 240

gagcaactga tcagccagcg gatcgaggag ttcgctagga accaggccat ctccgcctg 300

gagggactct ccaacctcta caaggtgtac gtgcgcgcgt tcagcgactg ggagaaggac 360

ccgaccaacc cggccctccg cgaggaaatg cgtatccagt tcaacgatat gaactcggcc 420

P34223W000_SEQ_PCT

ctcatcaccg ccatcccgt cttccgcgtg cagaactacg aggtggccct cctgtccgtg	480
tacgttcaag ccgccaacct ccacctctcc atcctccgcg acgtgagcgt gttcggcgag	540
cgctgggggt acgacaccgc caccatcaac aaccgctact ccgacctcac ctccctcatc	600
cacgtttaca ccaaccactg cgtggacacg tacaaccagg gcctccgccg cctggagggc	660
cgcttcctct ccgactggat cgtgtacaac cgcttccgcc gccagctcac catctccgtc	720
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gccgccaagt acccgacctt ctccgccgt gagtccgcca tcattcgag cccgcacctc	900
gtggacttcc tcaactcctt caccatctac accgactccc tcgcccgcag cgctactgg	960
ggcggtcacc tcgtgaactc cttccgcacc ggcaccacta ccaacctcat ccgcagcccg	1020
ctctacggcc gcgagggcaa caccgagcgc ccggtgacca tcaccgccag cccgagcgtg	1080
cccatcttcc gcaccctcag ctacccccacc ggcctggaca acagcaaccc tgtggcgggc	1140
atcgagggcg tggagttcca gaacaccatc tccaggagca tctaccgcaa gagcggccct	1200
atcgacagct tcagcgagct gcctcctcag gacgccagcg tgagccctgc catcggctac	1260
agccacaggc tgtgccacgc caccttcctg gagcgcacga gcggccctcg catcgcgggc	1320
accgtgttct cgtggaccca ccgcagcgcc tctcctacga acgaggtgtc tcctagtcgc	1380
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ctgaggggtca ctttactgg ccgcctgcct cagtcttact acatccgctt ccgctacgct	1560
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P34223W000_SEQ_PCT

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cgcctctccg acgagcgcaa cctgctccag gaccccaact tcaggggcat caacaggcag	2040
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aaggagaact acgttaccct ccccggcacc ttcgacgagt gttacccac ctaccttac	2160
cagaagatcg acgagtccaa gctgaaggcc tacacccgct accagctccg cggctacatc	2220
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agggacggcg agaagtgcgc ccaccatagc caccacttct ctctggacat cgacgtgggc	2460
tgcaccgacc tgaacgagga cctgggcgtg tgggttatct tcaagatcaa gaccaggac	2520
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tacaaggagg ggtacgggga ggggtgcgtt actattcatg agattgagaa caatactgat	3120
gagcttaagt tcaacaattg tgttgaggag gaggtttacc cgaacaatac tgttacgtgc	3180
atcaactaca cggcaacgca agaggaatac gaggggacgt acacctcgcg taatagaggg	3240
tatgatgagg cgtacggaaa caaccgctc gttccagcag attatgcctc ggtttatgag	3300

P34223W000_SEQ_PCT

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gattacacac cattaccagc aggatacgtt acaaaggagt tggaatactt cccggaaaca 3420
gataaagttt ggattgaaat cggagaaaca gaaggaacat tcatcgtcga cttagtagaa 3480
ttgttgttga tggaagaatg a 3501

<210> 38
<211> 1166
<212> PRT
<213> Artificial sequence

<220>
<223> Amino acid sequence of the engineered insecticidal protein
Cry1Da1_6 encoded by a synthetic DNA sequence wherein an
additional Alanine residue has been inserted at position 2.

<400> 38

Met Ala Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu
1 5 10 15

Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile
65 70 75 80

Glu Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
100 105 110

P34223W000_SEQ_PCT

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
115 120 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
130 135 140

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

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

Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
195 200 205

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
260 265 270

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

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
290 295 300

P34223W000_SEQ_PCT

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp
305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
355 360 365

Pro Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val
370 375 380

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
450 455 460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

P34223W000_SEQ_PCT

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val
595 600 605

Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
645 650 655

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser
675 680 685

P34223W000_SEQ_PCT

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
690 695 700

Val Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
740 745 750

Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu
755 760 765

Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn
770 775 780

Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys
785 790 795 800

Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
805 810 815

Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
820 825 830

Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
835 840 845

Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val
850 855 860

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu
865 870 875 880

P34223W000_SEQ_PCT

Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
885 890 895

Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala
900 905 910

Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr
915 920 925

Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
930 935 940

Glu Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
945 950 955 960

Asn Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn
965 970 975

Val Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val
980 985 990

Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
995 1000 1005

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
1010 1015 1020

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1025 1030 1035

Thr Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr
1040 1045 1050

Pro Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu
1055 1060 1065

P34223W000_SEQ_PCT

Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu
1070 1075 1080

Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val
1085 1090 1095

Tyr Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys
1100 1105 1110

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly
1115 1120 1125

Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val
1130 1135 1140

Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser
1145 1150 1155

Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 39
<211> 3501
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic DNA sequence designed for plant expression encoding
Cry1Da1_7 with an additional Alanine residue inserted at position
2.

<400> 39
atggctgaga tcaacaacca gaaccagtgc gtcccgtaga actgcctgag caaccctaag 60
gagatcatcc tgggtgagga acgcctggag accggcaaca ccgtagccga cattagcctg 120
ggcctcatca acttcctcta cagcaacttc gtgcccggcg gtggcttcat cgtgggcctc 180
ctggagctta tctggggcctt catcggccccg tcccagtggg acatcttcct cgcccagatc 240

P34223W000_SEQ_PCT

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gagggactct ccaacctcta caaggtgtac gtgcgcgcgt tcagcgactg ggagaaggac	360
ccgaccaacc cggccctccg cgaggaaatg cgtatccagt tcaacgatat gaactcggcc	420
ctcatcaccg ccatcccgtt cttccgcgtg cagaactacg aggtggccct cctgtccgtg	480
tacgttcaag ccgccaacct ccacctctcc atcctccgcg acgtgagcgt gttcggcgag	540
cgctggggct acgacaccgc caccatcaac aaccgctact ccgacctcac ctccctcatc	600
cacgtttaca ccaaccactg cgtggacacg tacaaccagg gcctccgccg cctggagggc	660
cgcttcctct ccgactggat cgtgtacaac cgcttcgcc gccagctcac catctccgtc	720
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gccgccgtct acccgacctt ctccgccgt gagtccgcca tcattcgag cccgcacctc	900
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ggcggtcacc tcgtgaactc cttccgcacc ggcaccacta ccaacctcat ccgcagcccg	1020
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cccatcttcc gcacctcag ctaccccacc ggcttggaac acagcaaccc tgtggcgggc	1140
atcgagggcg tggagttcca gaacaccatc tccaggagca tctaccgcaa gagcggccct	1200
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ttccctaaga ctatggacgc tggtagcct ctgaccagta ggagcttcgc tcacactact	1680

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gaccttgagc gcgcccagaa ggtggtgaac gccctcttca ctagcactaa ccagctaggc	1860
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tccgacgagt tctgcctcga cgagaagcgc gagctgtccg agaaggtgaa gcacgccaag	1980
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aaggagaact acgttaccct ccccggcacc ttcgacgagt gttacccac ctacctctac	2160
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gtccaccgga tccgggaggc ttaccttccg gagctttctg tcatcccggg tgtcaacgct	2820
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gaggtctctc aagaggctcg tgtttgcccg gggcgtgggt acattcttcg tgttactgcg	3060
tacaaggagg ggtacgggga ggggtgcgtt actattcatg agattgagaa caatactgat	3120

P34223W000_SEQ_PCT

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atcaactaca cggcaacgca agaggaatac gagggggacgt acacctcgcg taatagaggg 3240
tatgatgagg cgtacggaaa caacccgtcg gttccagcag attatgcctc ggtttatgag 3300
gagaagtcgt acacggatag acgacgcgag aatccatgtg agtcaaatcg aggatacggg 3360
gattacacac cattaccagc aggatacgtt acaaaggagt tggaatactt cccggaaaca 3420
gataaagttt ggattgaaat cggagaaaca gaaggaacat tcatcgtcga ctcagtagaa 3480
ttgttgttga tggaagaatg a 3501

<210> 40

<211> 1166

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the engineered insecticidal protein
Cry1Da1_7 encoded by a synthetic DNA sequence wherein an
additional Alanine residue has been inserted at position 2.

<400> 40

Met Ala Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu
1 5 10 15

Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile
65 70 75 80

P34223W000_SEQ_PCT

Glu Gln Leu Ile Ser Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
100 105 110

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
115 120 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
130 135 140

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

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

Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
195 200 205

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
260 265 270

P34223W000_SEQ_PCT

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

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp
305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
355 360 365

Pro Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val
370 375 380

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
450 455 460

P34223W000_SEQ_PCT

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Val
595 600 605

Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
645 650 655

P34223W000_SEQ_PCT

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Pro Asp Arg Gly Trp Arg Gly Ser
675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
690 695 700

Val Thr Leu Pro Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
740 745 750

Tyr Asn Ala Lys His Glu Ile Val Asn Val Pro Gly Thr Gly Ser Leu
755 760 765

Trp Pro Leu Ser Val Glu Asn Gln Ile Gly Pro Cys Gly Glu Pro Asn
770 775 780

Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu His Cys Ser Cys
785 790 795 800

Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
805 810 815

Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
820 825 830

Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
835 840 845

P34223W000_SEQ_PCT

Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ala Arg Val
850 855 860

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Thr Leu Gln Leu
865 870 875 880

Glu Thr Thr Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
885 890 895

Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala
900 905 910

Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg Glu Ala Tyr
915 920 925

Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
930 935 940

Glu Leu Glu Glu Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
945 950 955 960

Asn Ile Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Leu Cys Trp Asn
965 970 975

Val Lys Gly His Val Glu Val Glu Glu Gln Asn Asn His Arg Ser Val
980 985 990

Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
995 1000 1005

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
1010 1015 1020

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1025 1030 1035

P34223W000_SEQ_PCT

Thr Asp Glu Leu Lys Phe Asn Asn Cys Val Glu Glu Glu Val Tyr
1040 1045 1050

Pro Asn Asn Thr Val Thr Cys Ile Asn Tyr Thr Ala Thr Gln Glu
1055 1060 1065

Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Glu
1070 1075 1080

Ala Tyr Gly Asn Asn Pro Ser Val Pro Ala Asp Tyr Ala Ser Val
1085 1090 1095

Tyr Glu Glu Lys Ser Tyr Thr Asp Arg Arg Arg Glu Asn Pro Cys
1100 1105 1110

Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly
1115 1120 1125

Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val
1130 1135 1140

Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser
1145 1150 1155

Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 41

<211> 3423

<212> DNA

<213> Artificial sequence

<220>

<223> Synthetic DNA sequence designed for plant expression encoding
TIC844 with an additional Alanine residue inserted at position 2.

<400> 41

atggctgaga tcaacaacca gaaccagtgc gtcccgtaga actgcctgag caaccctaag

60

P34223W000_SEQ_PCT

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ctggagctta tctggggcctt catcggccccg tcccagtgagg acatcttcct cgcccagatc	240
gagcaactga tcagccagcg gatcaggagg ttcgctagga accaggccat ctcccgctg	300
gagggactct ccaacctcta caagggtgtac gtgcgcgcgt tcagcgactg ggagaaggac	360
ccgaccaacc cggccctccg cgaggaaatg cgtatccagt tcaacgatat gaactcggcc	420
ctcatcaccg ccatcccgct cttccgcgtg cagaactacg aggtggccct cctgtccgtg	480
tacgttcaag ccgccaacct ccacctctcc atcctccgcg acgtgagcgt gttcggcgag	540
cgctgggggct acgacaccgc caccatcaac aaccgctact ccgacctcac ctccctcatc	600
cacgtttaca ccaaccactg cgtggacacg tacaaccagg gcctccgccg cctggagggc	660
cgcttcctct ccgactggat cgtgtacaac cgcttcgcc gccagctcac catctccgtc	720
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accagctca ccgcgagggt ctacctgac ctcccgttca tcaacgagaa cctcagcccg	840
gccgccagct acccgacctt ctccgccgct gagtccgcca tcattcgag cccgcacctc	900
gtggacttcc tcaactcctt caccatctac accgactccc tcgcccgcta cgcctactgg	960
ggcggtcacc tcgtgaactc cttccgcacc ggaccacta ccaacctcat ccgcagcccg	1020
ctctacggcc gcgagggcaa caccgagcgc ccggtgacca tcaccgccag cccgagcgtg	1080
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P34223W000_SEQ_PCT

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gggtgtgtaca tcgacaggat cgagttcatc cccgtgaccg ccacgttcga ggccgagtac	1800
gaccttgagc gcgcccagaa ggctgtcaat gagctcttca cgtccagcaa tcagatcggc	1860
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tccgatgagt tctgcctcga cgagaagaag gagctgtccg agaaggtgaa gcatgccaaag	1980
cgtctcagcg acgagaggaa tctcctccag gaccccaatt tccgcggcat caacaggcag	2040
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cagaagatcg atgagtccaa gctcaaggct tacactcgct accagctccg cggctacatc	2220
gaagacagcc aagacctcga gatttacctg atccgctaca acgccaagca cgagaccgtc	2280
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gcccaccaca gccaccactt ctcttggac atcgatgtgg gctgcaccga cctgaacgag	2400
gacctcggag tctgggtcat cttcaagatc aagaccagg acggccacgc gcgcctgggc	2460
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aaggaggcca aggagagcgt cgacgccctg ttcgtgaact cccagtacga ccgcctgcag	2640
gccgacacca acatcgccat gatccacgct gccgacaaga gggcgcacag cattcgcgag	2700
gcctacctgc ctgagctgtc cgtgatccct ggtgtgaacg ctgccatctt tgaggagctg	2760
gagggccgca tctttaccgc attctccctg tacgacgccc gcaacgtgat caagaacggt	2820
gacttcaaca atggcctcag ctgctggaac gtcaagggcc acgtggacgt cgaggaacag	2880
aacaaccacc gtcctgcctt ggtcgtccca gagtgggagg ctgaggtctc ccaagaggtc	2940

P34223W000_SEQ_PCT

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gagggctgtg tgaccatcca cgagatcgag aacaacaccg acgagcttaa gttctccaac 3060
tgcgtggagg aggaggtgta cccaaacaac accgttactt gcaacgacta caccgccacc 3120
caggaggagt acgagggcac ctacacttcc aggaacaggg gctacgatgg tgcctacgag 3180
agcaacagca gcgttcctgc tgactacgct tccgcctacg aggagaaggc ctacacggat 3240
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gccggctacg ttaccaagga gctggagtac ttcccggaga ctgacaaggt gtggatcgag 3360
atcggcgaga ccgagggcac cttcatcgtg gacagcgtgg agctgctcct gatggaggag 3420
tag 3423

<210> 42

<211> 1140

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of the chimeric protein TIC844 encoded by a synthetic DNA sequence wherein an additional Alanine residue has been inserted at position 2.

<400> 42

Met Ala Glu Ile Asn Asn Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu
1 5 10 15

Ser Asn Pro Lys Glu Ile Ile Leu Gly Glu Glu Arg Leu Glu Thr Gly
20 25 30

Asn Thr Val Ala Asp Ile Ser Leu Gly Leu Ile Asn Phe Leu Tyr Ser
35 40 45

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

Trp Gly Phe Ile Gly Pro Ser Gln Trp Asp Ile Phe Leu Ala Gln Ile

P34223W000_SEQ_PCT

65		70		75		80									
Glu	Gln	Leu	Ile	Ser	Gln	Arg	Ile	Glu	Glu	Phe	Ala	Arg	Asn	Gln	Ala
				85				90						95	
Ile	Ser	Arg	Leu	Glu	Gly	Leu	Ser	Asn	Leu	Tyr	Lys	Val	Tyr	Val	Arg
			100					105					110		
Ala	Phe	Ser	Asp	Trp	Glu	Lys	Asp	Pro	Thr	Asn	Pro	Ala	Leu	Arg	Glu
		115					120					125			
Glu	Met	Arg	Ile	Gln	Phe	Asn	Asp	Met	Asn	Ser	Ala	Leu	Ile	Thr	Ala
	130					135					140				
Ile	Pro	Leu	Phe	Arg	Val	Gln	Asn	Tyr	Glu	Val	Ala	Leu	Leu	Ser	Val
145					150					155					160
Tyr	Val	Gln	Ala	Ala	Asn	Leu	His	Leu	Ser	Ile	Leu	Arg	Asp	Val	Ser
			165					170						175	
Val	Phe	Gly	Glu	Arg	Trp	Gly	Tyr	Asp	Thr	Ala	Thr	Ile	Asn	Asn	Arg
		180						185					190		
Tyr	Ser	Asp	Leu	Thr	Ser	Leu	Ile	His	Val	Tyr	Thr	Asn	His	Cys	Val
		195					200					205			
Asp	Thr	Tyr	Asn	Gln	Gly	Leu	Arg	Arg	Leu	Glu	Gly	Arg	Phe	Leu	Ser
	210					215					220				
Asp	Trp	Ile	Val	Tyr	Asn	Arg	Phe	Arg	Arg	Gln	Leu	Thr	Ile	Ser	Val
225					230					235					240
Leu	Asp	Ile	Val	Ala	Phe	Phe	Pro	Asn	Tyr	Asp	Ile	Arg	Thr	Tyr	Pro
			245						250					255	
Ile	Gln	Thr	Ala	Thr	Gln	Leu	Thr	Arg	Glu	Val	Tyr	Leu	Asp	Leu	Pro

P34223W000_SEQ_PCT

260

265

270

Phe Ile Asn Glu Asn Leu Ser Pro Ala Ala Ser Tyr Pro Thr Phe Ser
 275 280 285

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
 290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Tyr Ala Tyr Trp
 305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
 325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
 340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
 355 360 365

Ile Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val
 370 375 380

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
 385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
 405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
 420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
 435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile

P34223W000_SEQ_PCT

450

455

460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys
465 470 475 480

Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Thr Arg Asn Ser Met Gly
485 490 495

Glu Leu Gly Thr Leu Arg Val Thr Phe Thr Gly Arg Leu Pro Gln Ser
500 505 510

Tyr Tyr Ile Arg Phe Arg Tyr Ala Ser Val Ala Asn Arg Ser Gly Thr
515 520 525

Phe Arg Tyr Ser Gln Pro Pro Ser Tyr Gly Ile Ser Phe Pro Lys Thr
530 535 540

Met Asp Ala Gly Glu Pro Leu Thr Ser Arg Ser Phe Ala His Thr Thr
545 550 555 560

Leu Phe Thr Pro Ile Thr Phe Ser Arg Ala Gln Glu Glu Phe Asp Leu
565 570 575

Tyr Ile Gln Ser Gly Val Tyr Ile Asp Arg Ile Glu Phe Ile Pro Val
580 585 590

Thr Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala
595 600 605

Val Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp
610 615 620

Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu
625 630 635 640

Ser Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val

P34223W000_SEQ_PCT

645

650

655

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
 660 665 670

Asn Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser
 675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
 690 695 700

Val Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
 705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
 725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
 740 745 750

Tyr Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu
 755 760 765

Trp Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser
 770 775 780

His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu
 785 790 795 800

Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His
 805 810 815

Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly
 820 825 830

Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys

P34223W000_SEQ_PCT

835

840

845

Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys
850 855 860

Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln
865 870 875 880

Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His
885 890 895

Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val
900 905 910

Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe
915 920 925

Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn
930 935 940

Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln
945 950 955 960

Asn Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val
965 970 975

Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val
980 985 990

Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu
995 1000 1005

Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu
1010 1015 1020

Glu Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr

P34223W000_SEQ_PCT

1025 1030 1035

Ala Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg
1040 1045 1050

Gly Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp
1055 1060 1065

Tyr Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg
1070 1075 1080

Asp Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro
1085 1090 1095

Leu Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
1100 1105 1110

Thr Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe
1115 1120 1125

Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135 1140

<210> 43
<211> 3423
<212> DNA
<213> Artificial

<220>
<223> Synthetic DNA sequence designed for plant expression encoding
TIC844_8 with an additional Alanine residue inserted at position
2.

<400> 43
atggctgaga tcaacaacca gaaccagtgc gtcccgtaga actgcctgag caaccctaag 60
gagatcatcc tgggtgagga acgcctggag accggcaaca ccgtagccga cattagcctg 120
ggcctcatca acttcctcta cagcaacttc gtgcccggcg gtggcttcat cgtgggcctc 180

P34223W000_SEQ_PCT

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gagggactct ccaacctcta caaggtgtac gtgcgcgcgt tcagcgactg ggagaaggac	360
ccgaccaacc cggccctccg cgaggaaatg cgtatccagt tcaacgatat gaactcggcc	420
ctcatcaccg ccatcccgtt cttccgcgtg cagaactacg aggtggccct cctgtccgtg	480
tacgttcaag ccgccaacct ccacctctcc atcctccgcg acgtgagcgt gttcggcgag	540
cgctggggct acgacaccgc caccatcaac aaccgctact ccgacctcac ctccctcatc	600
cacgtttaca ccaaccactg cgtggacacg tacaaccagg gcctccgccg cctggagggc	660
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accagctca cccgcgaggt ctacctgac ctcccgttca tcaacgagaa cctcagcccg	840
gccgccgtct acccgacctt ctccgccgt gagtccgcca tcattcgag cccgcacctc	900
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ggcggtcacc tcgtgaactc cttccgcacc ggcaccacta ccaacctcat ccgcagcccg	1020
ctctacggcc gcgagggcaa caccgagcgc ccggtgacca tcaccgccag cccgagcgtg	1080
cccattctcc gcacctcag ctacccccacc ggcttgagca acagcaaccc tgtggcgggc	1140
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accgtgttct cgtggaccca ccgcagcgcc tctcctacga acgaggtgtc tcctagtgcg	1380
atcaccaga tcccttgggt caaggccac accctggcta gtggcgctag tgtcatcaag	1440
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ctgagggctca ctttactgg ccgcctgcct cagtcttact acatccgctt ccgctacgct	1560
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P34223W000_SEQ_PCT

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gcctacctgc ctgagctgtc cgtgatccct ggtgtgaacg ctgccatctt tgaggagctg	2760
gagggccgca tctttaccgc attctccctg tacgacgccc gcaacgtgat caagaacggt	2820
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aacaaccacc gtcctgcctt ggtcgtccca gagtgggagg ctgaggcttc ccaagaggtc	2940
cgcgctctgcc caggccgcgg ctacattctc agggtcaccg cttacaagga gggctacggt	3000
gagggctgtg tgaccatcca cgagatcgag aacaacaccg acgagcttaa gttctccaac	3060

P34223W000_SEQ_PCT

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agcaacagca gcgttcctgc tgactacgct tccgcctacg aggagaaggc ctacacggat	3240
ggccgcaggg acaacccttg cgagagcaac cgcggctacg gcgactacac tcccctgccc	3300
gccggctacg ttaccaagga gctggagtac ttcccgaga ctgacaaggt gtggatcgag	3360
atcggcgaga ccgagggcac cttcatcgtg gacagcgtgg agctgctcct gatggaggag	3420
tag	3423

<210> 44
 <211> 1140
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of the engineered insecticidal chimeric protein TIC844_8 encoded by a synthetic DNA sequence wherein an additional Alanine residue has been inserted at position 2.

<400> 44

Met	Ala	Glu	Ile	Asn	Asn	Gln	Asn	Gln	Cys	Val	Pro	Tyr	Asn	Cys	Leu
1				5				10						15	

Ser	Asn	Pro	Lys	Glu	Ile	Ile	Leu	Gly	Glu	Glu	Arg	Leu	Glu	Thr	Gly
			20					25					30		

Asn	Thr	Val	Ala	Asp	Ile	Ser	Leu	Gly	Leu	Ile	Asn	Phe	Leu	Tyr	Ser
		35					40					45			

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

Trp	Gly	Phe	Ile	Gly	Pro	Ser	Gln	Trp	Asp	Ile	Phe	Leu	Ala	Gln	Ile
65				70					75					80	

Glu	Gln	Leu	Ile	Ser	Gln	Arg	Ile	Glu	Glu	Phe	Ala	Arg	Asn	Gln	Ala
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

P34223W000_SEQ_PCT

85

90

95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Lys Val Tyr Val Arg
 100 105 110

Ala Phe Ser Asp Trp Glu Lys Asp Pro Thr Asn Pro Ala Leu Arg Glu
 115 120 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Ile Thr Ala
 130 135 140

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

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

Val Phe Gly Glu Arg Trp Gly Tyr Asp Thr Ala Thr Ile Asn Asn Arg
 180 185 190

Tyr Ser Asp Leu Thr Ser Leu Ile His Val Tyr Thr Asn His Cys Val
 195 200 205

Asp Thr Tyr Asn Gln Gly Leu Arg Arg Leu Glu Gly Arg Phe Leu Ser
 210 215 220

Asp Trp Ile Val Tyr Asn Arg Phe Arg Arg Gln Leu Thr Ile Ser Val
 225 230 235 240

Leu Asp Ile Val Ala Phe Phe Pro Asn Tyr Asp Ile Arg Thr Tyr Pro
 245 250 255

Ile Gln Thr Ala Thr Gln Leu Thr Arg Glu Val Tyr Leu Asp Leu Pro
 260 265 270

Phe Ile Asn Glu Asn Leu Ser Pro Ala Ala Val Tyr Pro Thr Phe Ser

P34223W000_SEQ_PCT

275

280

285

Ala Ala Glu Ser Ala Ile Ile Arg Ser Pro His Leu Val Asp Phe Leu
 290 295 300

Asn Ser Phe Thr Ile Tyr Thr Asp Ser Leu Ala Arg Ser Ala Tyr Trp
 305 310 315 320

Gly Gly His Leu Val Asn Ser Phe Arg Thr Gly Thr Thr Thr Asn Leu
 325 330 335

Ile Arg Ser Pro Leu Tyr Gly Arg Glu Gly Asn Thr Glu Arg Pro Val
 340 345 350

Thr Ile Thr Ala Ser Pro Ser Val Pro Ile Phe Arg Thr Leu Ser Tyr
 355 360 365

Pro Thr Gly Leu Asp Asn Ser Asn Pro Val Ala Gly Ile Glu Gly Val
 370 375 380

Glu Phe Gln Asn Thr Ile Ser Arg Ser Ile Tyr Arg Lys Ser Gly Pro
 385 390 395 400

Ile Asp Ser Phe Ser Glu Leu Pro Pro Gln Asp Ala Ser Val Ser Pro
 405 410 415

Ala Ile Gly Tyr Ser His Arg Leu Cys His Ala Thr Phe Leu Glu Arg
 420 425 430

Ile Ser Gly Pro Arg Ile Ala Gly Thr Val Phe Ser Trp Thr His Arg
 435 440 445

Ser Ala Ser Pro Thr Asn Glu Val Ser Pro Ser Arg Ile Thr Gln Ile
 450 455 460

Pro Trp Val Lys Ala His Thr Leu Ala Ser Gly Ala Ser Val Ile Lys

P34223W000_SEQ_PCT

465		470		475		480									
Gly	Pro	Gly	Phe	Thr	Gly	Gly	Asp	Ile	Leu	Thr	Arg	Asn	Ser	Met	Gly
				485					490					495	
Glu	Leu	Gly	Thr	Leu	Arg	Val	Thr	Phe	Thr	Gly	Arg	Leu	Pro	Gln	Ser
			500					505					510		
Tyr	Tyr	Ile	Arg	Phe	Arg	Tyr	Ala	Ser	Val	Ala	Asn	Arg	Ser	Gly	Thr
		515					520					525			
Phe	Arg	Tyr	Ser	Gln	Pro	Pro	Ser	Tyr	Gly	Ile	Ser	Phe	Pro	Lys	Thr
	530						535				540				
Met	Asp	Ala	Gly	Glu	Pro	Leu	Thr	Ser	Arg	Ser	Phe	Ala	His	Thr	Thr
545					550					555					560
Leu	Phe	Thr	Pro	Ile	Thr	Phe	Ser	Arg	Ala	Gln	Glu	Glu	Phe	Asp	Leu
				565					570					575	
Tyr	Ile	Gln	Ser	Gly	Val	Tyr	Ile	Asp	Arg	Ile	Glu	Phe	Ile	Pro	Val
			580					585					590		
Thr	Ala	Thr	Phe	Glu	Ala	Glu	Tyr	Asp	Leu	Glu	Arg	Ala	Gln	Lys	Ala
		595					600					605			
Val	Asn	Glu	Leu	Phe	Thr	Ser	Ser	Asn	Gln	Ile	Gly	Leu	Lys	Thr	Asp
	610					615					620				
Val	Thr	Asp	Tyr	His	Ile	Asp	Gln	Val	Ser	Asn	Leu	Val	Glu	Cys	Leu
625					630					635					640
Ser	Asp	Glu	Phe	Cys	Leu	Asp	Glu	Lys	Lys	Glu	Leu	Ser	Glu	Lys	Val
				645					650					655	
Lys	His	Ala	Lys	Arg	Leu	Ser	Asp	Glu	Arg	Asn	Leu	Leu	Gln	Asp	Pro

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660

665

670

Asn Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser
 675 680 685

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
 690 695 700

Val Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
 705 710 715 720

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
 725 730 735

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
 740 745 750

Tyr Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu
 755 760 765

Trp Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser
 770 775 780

His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu
 785 790 795 800

Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His
 805 810 815

Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly
 820 825 830

Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys
 835 840 845

Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys

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850

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860

Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln
865 870 875 880

Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His
885 890 895

Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val
900 905 910

Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe
915 920 925

Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn
930 935 940

Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln
945 950 955 960

Asn Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val
965 970 975

Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val
980 985 990

Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu
995 1000 1005

Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu
1010 1015 1020

Glu Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr
1025 1030 1035

Ala Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg

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1040

1045

1050

Gly Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp
1055 1060 1065

Tyr Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg
1070 1075 1080

Asp Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro
1085 1090 1095

Leu Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
1100 1105 1110

Thr Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe
1115 1120 1125

Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1130 1135 1140