

pctca2016050043-seq1
SEQUENCE LISTING

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<120> ROTAVIRUS LIKE PARTICLE PRODUCTION IN PLANTS

<130> V87566WO revised

<150> US 62/106,941

<151> 2015-01-15

<160> 53

<170> PatentIn version 3.5

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<212> DNA

<213> Artificial sequence

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<223> Expression enhancer CPMVX

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<223> A or C

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pctca2016050043-seq1

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<223> CPMV HT plus with a plant kozak consensus sequence

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<223> A or absent

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<222> (3)..(4)
<223> A or G

pctca2016050043-seq1

<220>
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 <223> A or C

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 <222> (531)..(533)
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 <212> DNA
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 <223> CPMV HT plus 511

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pctca2016050043-seq1

<220>

<223> CPMV HT plus WT 115

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<212> DNA

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<212> DNA

<213> Artificial Sequence

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<223> IF WA VP2 opt s1 to 4r

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<212> DNA

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<223> Optimized coding sequence of Rotavirus A VP2 from strain WA

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pctca2016050043-seq1

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pctca2016050043-seq1

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pctca2016050043-seq1

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 195 200 205

Asp Ser Glu Thr Ala Asn Ile Cys Asp Ala Ile Phe Gln Asp Glu Glu
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Thr Glu Gly Val Val Arg Arg Phe Ile Ala Asp Met Arg Gln Gln Val
 Page 13

pctca2016050043-seq1

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 Asp Val₂₉₀ Asn Tyr Ile Leu Asn₂₉₅ Met Asp Met Asn Leu₃₀₀ Pro Ser Thr Ala
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 Ser Leu Val₄₃₅ Ala Cys Glu Leu Ala₄₄₀ Ile Ile Asn Thr Ile₄₄₅ Val Tyr Pro
 Ala Phe₄₅₀ Gly Met Gln Arg Met₄₅₅ His Tyr Arg Asn Gly₄₆₀ Asp Pro Gln Thr
 Pro Phe Gln Ile Ala Glu₄₇₀ Gln Gln Ile Gln Asn₄₇₅ Phe Gln Val Ala Asn₄₈₀
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pctca2016050043-seq1

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505

510

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Ser Tyr Asn Tyr Glu Thr Leu Met Ala Cys Val Thr Met Asn Met Gln
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His Val Gln Thr Leu Thr Thr Glu Lys Leu Gln Leu Thr Ser Val Thr
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Ser Leu Cys Met Leu Ile Gly Asn Thr Thr Val Ile Pro Ser Pro Gln
 595 600 605

Thr Leu Phe His Tyr Tyr Asn Ile Asn Val Asn Phe His Ser Asn Tyr
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Asp Tyr Gly Gln Ile Thr Asn Met Leu Leu Asn Asn Gln Pro Val Ala
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 Page 15

pctca2016050043-seq1

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775

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Lys Ile Val Glu Gly Thr Leu Tyr Ser Asn Val Ser Asp Leu Ile Gln
 20 25 30

Gln Phe Asn Gln Met Ile Val Thr Met Asn Gly Asn Asp Phe Gln Thr
 35 40 45

Gly Gly Ile Gly Asn Leu Pro Val Arg Asn Trp Thr Phe Asp Phe Gly
 50 55 60

Leu Leu Gly Thr Thr Leu Leu Asn Leu Asp Ala Asn Tyr Val Glu Asn
 65 70 75 80

Ala Arg Thr Ile Ile Glu Tyr Phe Ile Asp Phe Ile Asp Asn Val Cys
 85 90 95

Met Asp Glu Met Ala Arg Glu Ser Gln Arg Asn Gly Val Ala Pro Gln
 100 105 110

Ser Glu Ala Leu Arg Lys Leu Ala Gly Ile Lys Phe Lys Arg Ile Asn
 115 120 125

Phe Asp Asn Ser Ser Glu Tyr Ile Glu Asn Trp Asn Leu Gln Asn Arg
 130 135 140

Arg Gln Arg Thr Gly Phe Val Phe His Lys Pro Asn Ile Phe Pro Tyr
 145 150 155 160

Ser Ala Ser Phe Thr Leu Asn Arg Ser Gln Pro Met His Asp Asn Leu
 165 170 175

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

Phe Asp Tyr Ser Cys Ala Ile Asn Ala Pro Ala Asn Ile Gln Gln Phe
 195 200 205

pctca2016050043-seq1

Glu His Ile Val Gln Leu Arg Arg Ala Leu Thr Thr Ala Thr Ile Thr
210 215 220

Leu Leu Pro Asp Ala Glu Arg Phe Ser Phe Pro Arg Val Ile Asn Ser
225 230 235 240

Ala Asp Gly Ala Thr Thr Trp Phe Phe Asn Pro Val Ile Leu Arg Pro
245 250 255

Asn Asn Val Glu Val Glu Phe Leu Leu Asn Gly Gln Ile Ile Asn Thr
260 265 270

Tyr Gln Ala Arg Phe Gly Thr Ile Ile Ala Arg Asn Phe Asp Ala Ile
275 280 285

Arg Leu Leu Phe Gln Leu Met Arg Pro Pro Asn Met Thr Pro Ala Val
290 295 300

Asn Ala Leu Phe Pro Gln Ala Gln Pro Phe Gln His His Ala Thr Val
305 310 315 320

Gly Leu Thr Leu Arg Ile Glu Ser Ala Val Cys Glu Ser Val Leu Ala
325 330 335

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

Tyr Ala Ile Pro Val Gly Pro Val Phe Pro Pro Gly Met Asn Trp Thr
355 360 365

Glu Leu Ile Thr Asn Tyr Ser Pro Ser Arg Glu Asp Asn Leu Gln Arg
370 375 380

Val Phe Thr Val Ala Ser Ile Arg Ser Met Leu Ile Lys
385 390 395

<210> 30
<211> 53
<212> DNA
<213> Artificial Sequence

<220>
<223> IF Rtx VP4 opt s1 plus 3c

<400> 30
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53

<210> 31
<211> 55
<212> DNA
<213> Artificial Sequence

<220>
<223> IF Rtx VP4 opt s1 to 4r

pctca2016050043-seq1

<400> 31
actaaagaaa ataggccttc agagtttaca ttgcaggatt aattgctcaa tccta 55

<210> 32
<211> 2328
<212> DNA
<213> Artificial Sequence

<220>
<223> Optimized coding sequence of Rotavirus A VP4

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gtcgaaccca ttctggacgg gccataccaa cccaccacct tcaccccacc taatgattat 240
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pctca2016050043-seq1

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 <212> DNA
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<220>
 <223> Expression cassette number 1730

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pctca2016050043-seq1

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<210> 34

<211> 775

<212> PRT

<213> Artificial Sequence

<220>

<223> Amino acid sequence of VP4 from Rotavirus A Rotarix strain

<400> 34

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Asp Leu His Asp Glu Ile Glu Gln Ile Gly Ser Glu Lys Thr Gln Asn
20 25 30

Val Thr Ile Asn Pro Gly Pro Phe Ala Gln Thr Arg Tyr Ala Pro Val
35 40 45

Asn Trp Asp His Gly Glu Ile Asn Asp Ser Thr Thr Val Glu Pro Ile
50 55 60

Leu Asp Gly Pro Tyr Gln Pro Thr Thr Phe Thr Pro Pro Asn Asp Tyr
65 70 75 80

Trp Ile Leu Ile Asn Ser Asn Thr Asn Gly Val Val Tyr Glu Ser Thr
85 90 95

pctca2016050043-seq1

Asn Asn Ser Asp Phe Trp Thr Ala Val Val Ala Ile Glu Pro His Val
100 105 110

Asn Pro Val Asp Arg Gln Tyr Met Ile Phe Gly Glu Ser Lys Gln Phe
115 120 125

Asn Val Ser Asn Asp Ser Asn Lys Trp Lys Phe Leu Glu Met Phe Arg
130 135 140

Ser Ser Ser Gln Asn Glu Phe Tyr Asn Arg Arg Thr Leu Thr Ser Asp
145 150 155 160

Thr Arg Leu Val Gly Ile Phe Lys Tyr Gly Gly Arg Val Trp Thr Phe
165 170 175

His Gly Glu Thr Pro Arg Ala Thr Thr Asp Ser Ser Ser Thr Ala Asn
180 185 190

Leu Asn Asn Ile Ser Ile Thr Ile His Ser Glu Phe Tyr Ile Ile Pro
195 200 205

Arg Ser Gln Glu Ser Lys Cys Asn Glu Tyr Ile Asn Asn Gly Leu Pro
210 215 220

Pro Ile Gln Asn Thr Arg Asn Val Val Pro Leu Pro Leu Ser Ser Arg
225 230 235 240

Ser Ile Gln Tyr Lys Arg Ala Gln Val Asn Glu Asp Ile Ile Val Ser
245 250 255

Lys Thr Ser Leu Trp Lys Glu Met Gln Tyr Asn Arg Asp Ile Ile Ile
260 265 270

Arg Phe Lys Phe Gly Asn Ser Ile Val Lys Met Gly Gly Leu Gly Tyr
275 280 285

Lys Trp Ser Glu Ile Ser Tyr Lys Ala Ala Asn Tyr Gln Tyr Asn Tyr
290 295 300

Leu Arg Asp Gly Glu Gln Val Thr Ala His Thr Thr Cys Ser Val Asn
305 310 315 320

Gly Val Asn Asn Phe Ser Tyr Asn Gly Gly Phe Leu Pro Thr Asp Phe
325 330 335

Gly Ile Ser Arg Tyr Glu Val Ile Lys Glu Asn Ser Tyr Val Tyr Val
340 345 350

Asp Tyr Trp Asp Asp Ser Lys Ala Phe Arg Asn Met Val Tyr Val Arg
355 360 365

pctca2016050043-seq1

Ser Leu Ala Ala Asn Leu Asn Ser Val Lys Cys Thr Gly Gly Ser Tyr
370 375 380

Tyr Phe Ser Ile Pro Val Gly Ala Trp Pro Val Met Asn Gly Gly Ala
385 390 395 400

Val Ser Leu His Phe Ala Gly Val Thr Leu Ser Thr Gln Phe Thr Asp
405 410 415

Phe Val Ser Leu Asn Ser Leu Arg Phe Arg Phe Ser Leu Thr Val Asp
420 425 430

Glu Pro Pro Phe Ser Ile Leu Arg Thr Arg Thr Val Asn Leu Tyr Gly
435 440 445

Leu Pro Ala Ala Asn Pro Asn Asn Gly Asn Glu Tyr Tyr Glu Ile Ser
450 455 460

Gly Arg Phe Ser Leu Ile Ser Leu Val Pro Thr Asn Asp Asp Tyr Gln
465 470 475 480

Thr Pro Ile Met Asn Ser Val Thr Val Arg Gln Asp Leu Glu Arg Gln
485 490 495

Leu Thr Asp Leu Arg Glu Glu Phe Asn Ser Leu Ser Gln Glu Ile Ala
500 505 510

Met Ala Gln Leu Ile Asp Leu Ala Leu Leu Pro Leu Asp Met Phe Ser
515 520 525

Met Phe Ser Gly Ile Lys Ser Thr Ile Asp Leu Thr Lys Ser Met Ala
530 535 540

Thr Ser Val Met Lys Lys Phe Arg Lys Ser Lys Leu Ala Thr Ser Ile
545 550 555 560

Ser Glu Met Thr Asn Ser Leu Ser Asp Ala Ala Ser Ser Ala Ser Arg
565 570 575

Asn Val Ser Ile Arg Ser Asn Leu Ser Ala Ile Ser Asn Trp Thr Asn
580 585 590

Val Ser Asn Asp Val Ser Asn Val Thr Asn Ser Leu Asn Asp Ile Ser
595 600 605

Thr Gln Thr Ser Thr Ile Ser Lys Lys Leu Arg Leu Lys Glu Met Ile
610 615 620

Thr Gln Thr Glu Gly Met Ser Phe Asp Asp Ile Ser Ala Ala Val Leu
625 630 635 640

pctca2016050043-seq1

Lys Thr Lys Ile Asp Met Ser Thr Gln Ile Gly Lys Asn Thr Leu Pro
645 650 655

Asp Ile Val Thr Glu Ala Ser Glu Lys Phe Ile Pro Lys Arg Ser Tyr
660 665 670

Arg Ile Leu Lys Asp Asp Glu Val Met Glu Ile Asn Thr Glu Gly Lys
675 680 685

Phe Phe Ala Tyr Lys Ile Asn Thr Phe Asp Glu Val Pro Phe Asp Val
690 695 700

Asn Lys Phe Ala Glu Leu Val Thr Asp Ser Pro Val Ile Ser Ala Ile
705 710 715 720

Ile Asp Phe Lys Thr Leu Lys Asn Leu Asn Asp Asn Tyr Gly Ile Thr
725 730 735

Arg Thr Glu Ala Leu Asn Leu Ile Lys Ser Asn Pro Asn Met Leu Arg
740 745 750

Asn Phe Ile Asn Gln Asn Asn Pro Ile Ile Arg Asn Arg Ile Glu Gln
755 760 765

Leu Ile Leu Gln Cys Lys Leu
770 775

<210> 35
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> IF TrSP plus Rtx VP7j opt s1 plus 3c

<400> 35
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50

<210> 36
<211> 54
<212> DNA
<213> Artificial Sequence

<220>
<223> IF Rtx VP7 opt s1 to 4r

<400> 36
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54

<210> 37
<211> 981
<212> DNA
<213> Artificial Sequence

<220>
<223> optimized coding sequence of Rotavirus A VP7

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<211> 2634
<212> DNA
<213> Artificial Sequence

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pctca2016050043-seq1

<212> PRT

<213> Artificial sequence

<220>

<223> Amino acid sequence of TrSp-VP7

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

Thr Ser Thr Leu Cys Leu Tyr Tyr Pro Thr Glu Ala Ser Thr Gln Ile
50 55 60

Asn Asp Gly Glu Trp Lys Asp Ser Leu Ser Gln Met Phe Leu Thr Lys
65 70 75 80

Gly Trp Pro Thr Gly Ser Val Tyr Phe Lys Glu Tyr Ser Ser Ile Val
85 90 95

Asp Phe Ser Val Asp Pro Gln Leu Tyr Cys Asp Tyr Asn Leu Val Leu
100 105 110

Met Lys Tyr Asp Gln Asn Leu Glu Leu Asp Met Ser Glu Leu Ala Asp
115 120 125

Leu Ile Leu Asn Glu Trp Leu Cys Asn Pro Met Asp Ile Thr Leu Tyr
130 135 140

Tyr Tyr Gln Gln Ser Gly Glu Ser Asn Lys Trp Ile Ser Met Gly Ser
145 150 155 160

Ser Cys Thr Val Lys Val Cys Pro Leu Asn Thr Gln Met Leu Gly Ile
165 170 175

Gly Cys Gln Thr Thr Asn Val Asp Ser Phe Glu Met Val Ala Glu Asn
180 185 190

Glu Lys Leu Ala Ile Val Asp Val Val Asp Gly Ile Asn His Lys Ile
195 200 205

Asn Leu Thr Thr Thr Thr Cys Thr Ile Arg Asn Cys Lys Lys Leu Gly
210 215 220

Pro Arg Glu Asn Val Ala Val Ile Gln Val Gly Gly Ser Asn Val Leu
225 230 235 240

pctca2016050043-seq1

Asp Ile Thr Ala Asp Pro Thr Thr Asn Pro Gln Thr Glu Arg Met Met
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 <213> Rotavirus

<400> 44

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Phe Leu Tyr Ile Ala Ser Val Leu Thr Val Leu Phe Thr Leu His Lys	
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Ala Ser Ile Pro Thr Met Lys Ile Ala Leu Lys Thr Ser Lys Cys Ser	
50 55 60	

Tyr Lys Val Ile Lys Tyr Cys Ile Val Thr Ile Ile Asn Thr Leu Leu	
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Lys Leu Ala Gly Tyr Lys Glu Gln Val Thr Thr Lys Asp Glu Ile Glu	
85 90 95	

Gln Gln Met Asp Arg Ile Val Lys Glu Met Arg Arg Gln Leu Glu Met	
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Arg Ile His Asp Asn Leu Ile Thr Arg Pro Val Asp Val Ile Asp Met	
130 135 140	

Ser Lys Glu Phe Asn Gln Lys Asn Ile Lys Thr Leu Asp Glu Trp Glu	
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 <212> DNA
 <213> Artificial sequence

<220>
 <223> IF C160 WA VP6 opt c

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 <212> DNA
 <213> Artificial sequence

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 <213> Artificial Sequence

<220>
 <223> IF C160 Rtx VP4 opt c

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 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Expression cassette number 1178

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 <213> Artificial Sequence

<220>
 <223> IF C160 TrSP plus Rtx VP7 opt c

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