

SEQUENCE LISTING

<110> DSM IP Assets B.V.

<120> Optimization of C-8 sterol isomerization

<130> 32959-WO-PCT

<160> 22

<170> PatentIn version 3.5

<210> 1

<211> 669

<212> DNA

<213> *Saccharomyces cerevisiae*

<400> 1

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<211> 726

<212> DNA

<213> *Ustilago maydis*

<400> 2

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<213> Candida albicans

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<213> Schizosaccharomyces pombe

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<213> Saccharomyces cerevisiae

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Pro Lys Thr Leu Asn Glu Ile Cys Asn Ser Val Ile Ser Lys His Asn
35 40 45

Ala Ala Glu Gly Leu Ser Thr Glu Asp Leu Leu Gln Asp Val Arg Asp
50 55 60

Ala Leu Ala Ser His Tyr Gly Asp Glu Tyr Ile Asn Arg Tyr Val Lys
65 70 75 80

Glu Glu Trp Val Phe Asn Asn Ala Gly Gly Ala Met Gly Gln Met Ile
85 90 95

Ile Leu His Ala Ser Val Ser Glu Tyr Leu Ile Leu Phe Gly Thr Ala
100 105 110

Val Gly Thr Glu Gly His Thr Gly Val His Phe Ala Asp Asp Tyr Phe
115 120 125

Thr Ile Leu His Gly Thr Gln Ile Ala Ala Leu Pro Tyr Ala Thr Glu
130 135 140

Ala Glu Val Tyr Thr Pro Gly Met Thr His His Leu Lys Lys Gly Tyr
145 150 155 160

Ala Lys Gln Tyr Ser Met Pro Gly Gly Ser Phe Ala Leu Glu Leu Ala
165 170 175

Gln Gly Trp Ile Pro Cys Met Leu Pro Phe Gly Phe Leu Asp Thr Phe
180 185 190

Ser Ser Thr Leu Asp Leu Tyr Thr Leu Tyr Arg Thr Val Tyr Leu Thr
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Ala Arg Asp Met Gly Lys Asn Leu Leu Gln Asn Lys Lys Phe
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<210> 6

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<212> PRT

<213> Ustilago maydis

<400> 6

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35 40 45

Ile Phe Asp His Lys Ala Ile Tyr Lys Ile Ala Ser Thr Ala Val Ala
50 55 60

Asn His Pro Gly Asn Ala Thr Ala Ile Phe Asp Asp Val Leu Asp Asn
65 70 75 80

Leu Arg Ala Asp Pro Lys Leu Ala Pro Tyr Ile Asn Lys Asn His Phe
85 90 95

Ser Asp Glu Ser Glu Trp Met Phe Asn Asn Ala Gly Gly Ala Met Gly
100 105 110

Ser Met Phe Ile Ile His Ala Ser Val Thr Glu Tyr Leu Ile Phe Phe
115 120 125

Gly Thr Pro Val Gly Thr Glu Gly His Thr Gly Arg His Thr Ala Asp
130 135 140

Asp Tyr Phe Asn Ile Leu Thr Gly Asn Gln Tyr Ala Phe Pro Ala Gly
145 150 155 160

Ala Leu Lys Ala Glu His Tyr Pro Ala Gly Ser Val His His Leu Arg

165

170

175

Arg Gly Thr Val Lys Gln Tyr Met Met Pro Glu Asp Gly Cys Trp Ala
 180 185 190

Leu Glu Leu Ala Gln Gly Trp Ile Pro Pro Met Leu Pro Phe Gly Leu
 195 200 205

Ala Asp Val Leu Ser Ser Thr Leu Asp Leu Pro Thr Phe Gly Ile Thr
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<210> 7

<211> 217

<212> PRT

<213> Candida albicans

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Lys Gln Val Leu Gln Glu Leu Val Gln Glu Thr Leu Lys Asp His Pro
 35 40 45

Asp Gly Asn Ala Thr Ala Ile Met Ile Asp Leu Thr Pro Lys Ile Gln
 50 55 60

Lys Lys Tyr Pro Lys Ile Ile Asn Asp Leu Asn Phe Asp Asp Trp Val
 65 70 75 80

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Ser Ile Ser Glu Tyr Leu Ile Phe Phe Gly Thr Ala Ile Gly Thr Glu
100 105 110

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

Gly Glu Gln Arg Ala Ala Tyr Pro Gly Ala Leu Ile Pro Glu Val Tyr
130 135 140

Leu Pro Gly Asp Gln His His Leu Pro Lys Gly His Val Lys Gln Tyr
145 150 155 160

Ala Met Pro Gly Glu Ser Phe Ala Leu Glu Leu Ala Gln Gly Trp Ile
165 170 175

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

Asp Phe Tyr Thr Phe Tyr Leu Thr Ala Tyr Tyr Thr Gly Lys Asp Met
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Ile Lys Asn Leu Leu Ile Gly Lys Phe
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<210> 8

<211> 219

<212> PRT

<213> Schizosaccharomyces pombe

<400> 8

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Leu Ile Tyr Tyr Ile Gln Lys Tyr His Leu Arg Ser Phe Tyr Gln Phe

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Asp Pro Ala Lys Leu Gln Glu Leu Ser Lys Gln Ser Ile Ala Leu Tyr
35 40 45

Ala Asn Asp Thr Lys Ala Leu Leu Tyr Asp Leu Ser Asp Arg Leu Val
50 55 60

Ala Glu Tyr Gly Asp Leu Ile Thr Pro Val Asn Gln Asp Glu Trp Val
65 70 75 80

His Asn Asn Ala Gly Gly Ala Met Gly Thr Met Phe Ile Leu His Ala
85 90 95

Ser Phe Ser Glu Tyr Leu Ile Phe Phe Gly Thr Pro Ile Gly Thr Glu
100 105 110

Gly His Ser Gly Val His Met Ala Asp Asp Tyr Phe Thr Ile Leu Arg
115 120 125

Gly Arg Gln Leu Ala Ala Ser Ala Asn Asp Leu Glu Ala Arg Val Tyr
130 135 140

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

Ser Met Pro Ser Gly Glu Pro Cys Phe Ala Leu Glu Leu Ala Gln Gly
165 170 175

Trp Ile Val Ser Met Leu Pro Phe Gly Phe Met Asp Gly Leu Phe Ser
180 185 190

Thr Ile Asp Phe Gly Thr Leu Tyr Lys Thr Val Tyr Phe Thr Ala Gly
195 200 205

Arg Met Leu Lys Ser Val Leu Met Gly Lys Phe
210 215

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<210> 9
 <211> 726
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> S. cerevisiae codon-optimized U. maydis ERG2

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<210> 10
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 <212> DNA
 <213> Artificial Sequence

<220>
 <223> S. cerevisiae codon-optimized C. albicans ERG2

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<210> 11
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<213> Artificial Sequence

<220>
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<210> 12

<211> 610

<212> PRT

<213> *Saccharomyces cerevisiae*

<400> 12

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20 25 30

Asp Asn Val Ile Leu Pro Gln Glu Ser Met Glu Val Ser Pro Arg Ser
35 40 45

Ser Thr Thr Ser Leu Val Glu Pro Val Glu Ser Thr Glu Gly Val Glu
50 55 60

Ser Thr Glu Ala Glu Arg Val Ala Gly Lys Gln Glu Gln Glu Glu Glu
65 70 75 80

Tyr Pro Val Asp Ala His Met Gln Lys Tyr Leu Ser His Leu Lys Ser
85 90 95

Lys Ser Arg Ser Arg Phe His Arg Lys Asp Ala Ser Lys Tyr Val Ser
100 105 110

Phe Phe Gly Asp Val Ser Phe Asp Pro Arg Pro Thr Leu Leu Asp Ser
115 120 125

Ala Ile Asn Val Pro Phe Gln Thr Thr Phe Lys Gly Pro Val Leu Glu
130 135 140

Lys Gln Leu Lys Asn Leu Gln Leu Thr Lys Thr Lys Thr Lys Ala Thr
145 150 155 160

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Val Lys Thr Thr Val Lys Thr Thr Glu Lys Thr Asp Lys Ala Asp Ala
165 170 175

Pro Pro Gly Glu Lys Leu Glu Ser Asn Phe Ser Gly Ile Tyr Val Phe
180 185 190

Ala Trp Met Phe Leu Gly Trp Ile Ala Ile Arg Cys Cys Thr Asp Tyr
195 200 205

Tyr Ala Ser Tyr Gly Ser Ala Trp Asn Lys Leu Glu Ile Val Gln Tyr
210 215 220

Met Thr Thr Asp Leu Phe Thr Ile Ala Met Leu Asp Leu Ala Met Phe
225 230 235 240

Leu Cys Thr Phe Phe Val Val Phe Val His Trp Leu Val Lys Lys Arg
245 250 255

Ile Ile Asn Trp Lys Trp Thr Gly Phe Val Ala Val Ser Ile Phe Glu
260 265 270

Leu Ala Phe Ile Pro Val Thr Phe Pro Ile Tyr Val Tyr Tyr Phe Asp
275 280 285

Phe Asn Trp Val Thr Arg Ile Phe Leu Phe Leu His Ser Val Val Phe
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Val Met Lys Ser His Ser Phe Ala Phe Tyr Asn Gly Tyr Leu Trp Asp
305 310 315 320

Ile Lys Gln Glu Leu Glu Tyr Ser Ser Lys Gln Leu Gln Lys Tyr Lys
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Glu Ser Leu Ser Pro Glu Thr Arg Glu Ile Leu Gln Lys Ser Cys Asp
340 345 350

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Leu Val Tyr Gln Ile Asn Tyr Pro Arg Thr Ser Arg Ile Arg Trp Arg
385 390 395 400

Tyr Val Leu Glu Lys Val Cys Ala Ile Ile Gly Thr Ile Phe Leu Met
405 410 415

Met Val Thr Ala Gln Phe Phe Met His Pro Val Ala Met Arg Cys Ile
420 425 430

Gln Phe His Asn Thr Pro Thr Phe Gly Gly Trp Ile Pro Ala Thr Gln
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Glu Trp Phe His Leu Leu Phe Asp Met Ile Pro Gly Phe Thr Val Leu
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Tyr Met Leu Thr Phe Tyr Met Ile Trp Asp Ala Leu Leu Asn Cys Val
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Ala Glu Leu Thr Arg Phe Ala Asp Arg Tyr Phe Tyr Gly Asp Trp Trp
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Asn Cys Val Ser Phe Glu Glu Phe Ser Arg Ile Trp Asn Val Pro Val
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His Lys Phe Leu Leu Arg His Val Tyr His Ser Ser Met Gly Ala Leu
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His Leu Ser Lys Ser Gln Ala Thr Leu Phe Thr Phe Phe Leu Ser Ala
530 535 540

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Val Phe His Glu Met Ala Met Phe Ala Ile Phe Arg Arg Val Arg Gly
545 550 555 560

Tyr Leu Phe Met Phe Gln Leu Ser Gln Phe Val Trp Thr Ala Leu Ser
 565 570 575

Asn Thr Lys Phe Leu Arg Ala Arg Pro Gln Leu Ser Asn Val Val Phe
 580 585 590

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Thr Leu
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<212> DNA
<213> *Saccharomyces cerevisiae*

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<212> PRT

<213> Pichia pastoris

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Tyr Leu Lys Thr Leu Gly His Leu Thr Gly Ala Asn Asn Thr Met Glu
35 40 45

Ser Leu Phe Gly Ile Ala Pro Asn Val Asp Gln Ala Ser Lys Asn His
50 55 60

Trp Leu Arg Thr Val Asn Asp Ser Ile Ala Leu Ala Arg Pro Gly Glu
65 70 75 80

Arg Leu Val Tyr Gly Val Asn Ala Pro Leu His Phe Phe Asp Glu Thr
85 90 95

Ala Tyr Thr Tyr Ala Ser Ile Leu Gly Arg Ser Asn Ile Ile Arg Gln
100 105 110

Phe Thr Thr Leu Met Ile Leu Met Ile Leu Phe Gly Trp Gly Leu Tyr
115 120 125

Leu Ser Val Ala Ser Phe Ser Tyr Tyr Phe Val Phe Asp Lys Ala Ile
130 135 140

Phe Asn His Pro Arg Tyr Leu Lys Asn Gln Met Ser Leu Glu Ile His
145 150 155 160

Gln Ala Leu Thr Ala Ile Pro Thr Met Val Leu Leu Thr Val Pro Trp
165 170 175

Phe Leu Ile Glu Leu Arg Gly Tyr Ser Lys Leu Tyr Phe Asp Val Asn
180 185 190

Glu Ser Thr Gly Gly Trp Lys Ala Ile Ile Trp Gln Ile Pro Cys Phe
195 200 205

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225 230 235 240

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245 250 255

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260 265 270

Lys Val Ser Tyr Leu Ile Leu Phe Gly Leu Val Asn Phe Trp Thr Val
275 280 285

Met Ile His Asp Gly Glu Tyr Leu Ser Arg Asp Pro Ile Val Asn Gly
290 295 300

Ala Ala Cys His Thr Val His His Leu Tyr Phe Asn Tyr Asn Tyr Gly
305 310 315 320

Gln Phe Thr Thr Leu Trp Asp Arg Leu Gly Gly Ser Tyr Arg Met Pro
325 330 335

Asp Lys Glu Leu Phe Asp Lys Asn Lys Lys Lys Asp Val Lys Thr Trp
340 345 350

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355 360 365

Lys Glu Asp Phe Arg Glu Tyr Gly Thr Glu Glu Lys Leu Lys Ser Thr
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<210> 15

<211> 1155

<212> DNA

<213> Pichia pastoris

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